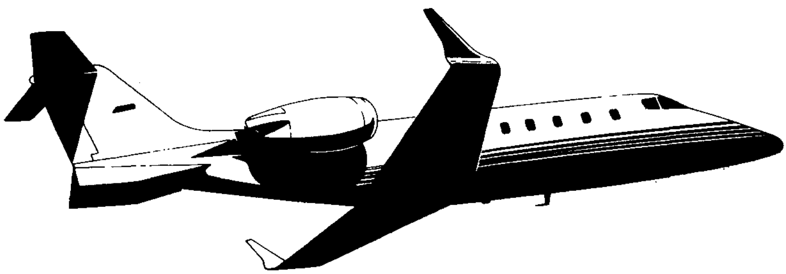
PILOT'S MANUAL

Learjet 60



This Pilot's Manual provides information supplemental to the Learjet 60 FAA Approved Airplane Flight Manual. In the event any information herein conflicts with information in the FAA Approved Airplane Flight Manual, the FAA Approved Airplane Flight Manual shall take precedence.

BOMBARDIER Learjet

PM -123

July 1993

Subject: Learjet 60 Pilots Manual — Change 6

The following summary describes the changes that are incorporated with this change.

FRONT MATTER

Introduction	Updated LOEP.

SECTION IV — ELECTRICAL & LIGHTING

Emergency Power System	Added aircraft effectivity for N1 indicators standby power source.
Page 4-20	Reformatted text no content change.
Anti-Collision Beacon Strobe Lights	Revised beacon strobe operation when modified by SB-60-33-7.
Exit Signs	Added description of exit signs.

SECTION VI — ANTI-ICE & ENVIRONMENTAL

Rosemount Ice Detector System (Page 6-2 & 6-3)	Reformatted and added text.
Page 6-4 thru 6-7	Reformatted text no content change.
Page 6-9	Removed text repeated from page 6-8.
Page 6-10	Reformatted text no content change.

SECTION VII— INTERIOR EQUIPMENT

Cabinets Drawers & Tables	Added description of optional equipment (Jump Seat).
Iridium Satcom System	Revised description of Iridium Satcom system.
Ski Storage Box	Added description of ski storage box.
Page 7-38 and 7-39	Reformatted text no content change.

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Change	2	January 1994
Change	3	December 1994
Change	4	April 2002
Change	5	July 2005
Change	6	October 2009

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INTRODUCTION

The information in this manual is intended to augment the information in the Learjet 60 FAA Approved Airplane Flight Manual and in no manner supersedes any Flight Manual limitations, procedures, or performance data. In the event that any information in this manual should conflict with that in the FAA Approved Airplane Flight Manual, the FAA Approved Airplane Flight Manual shall take precedence.

THE MANUAL

Sections I through VII of this manual are intended to provide the operator of the Learjet 60 with a basic description of the aircraft operating systems from the cockpit controls and indicators to the actuating mechanisms in the systems. No attempt has been made to establish a specific standard aircraft due to the numerous customer options. Therefore, the illustrations and descriptions within this manual are for a "typical" aircraft and may not match a specific aircraft. Specific serialization is shown only when more than one version of the same system is incorporated into production on a nonretrofit basis.

Section VIII of this manual contains tabular performance and fuel consumption data derived from the Flight Manual and flight testing. This data may be used by the operator for flight planning.

REVISING THE MANUAL

Periodically, Numbered Changes may be issued against this manual. Pages included in Numbered Changes supersede like numbered pages in the Pilot's Manual. Each page of a Numbered Change will contain a "Change" number located at the lower inside margin of the page. Portions of the text affected by the change are indicated by a vertical bar at the outer margin of the page. The vertical bars may not appear on pages that contain graphs or tables. Additionally, when a "changed" page occurs as the result of a rearrangement of material due to a change on a previous page, no vertical bar will appear.

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SECTION I
GENERAL DESCRIPTION

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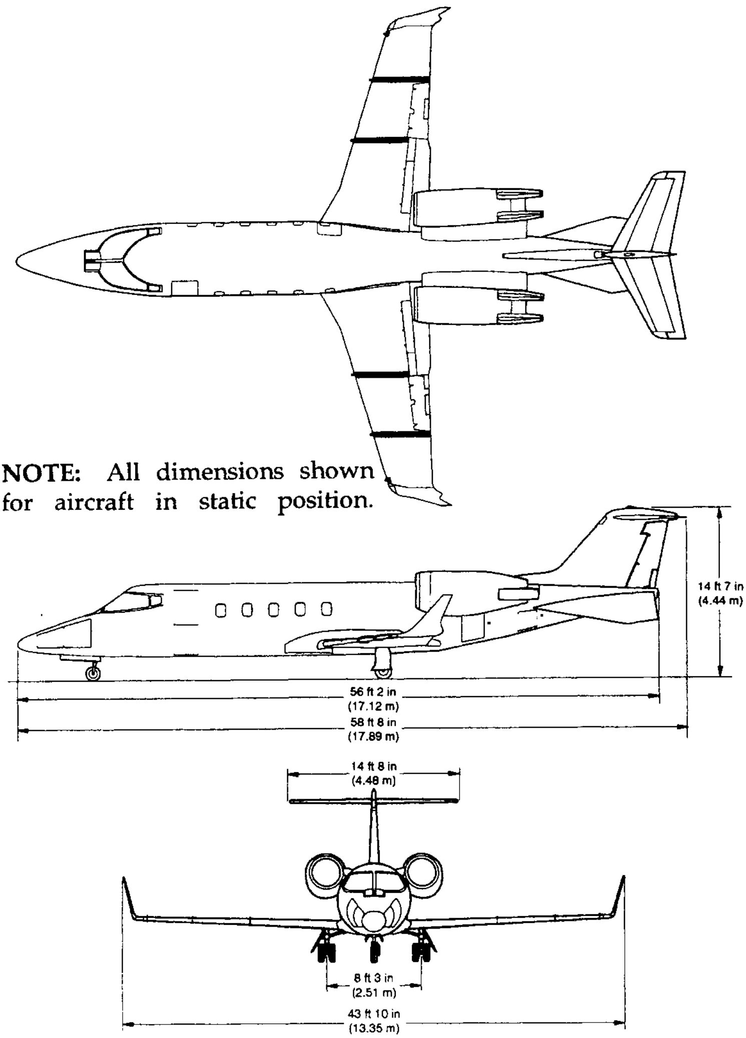
SECTION I
GENERAL DESCRIPTION

AIRCRAFT GENERAL DESCRIPTION

The Learjet Model 60 aircraft, manufactured by Learjet, Inc., is an all metal, pressurized, low-wing, turbofan-powered monoplane. The high-aspect ratio, fully cantilevered, swept-back wings with winglets are of conventional riveted construction except for the upper section of the winglets, which is full-depth honeycomb core bonded to the outer skin. The fuselage is of "area rule" design and semi-monocoque construction. Two inverted "V" ventral fins (delta fins) are fitted to the aft section of the tailcone to provide the aircraft with favorable stall recovery characteristics and additional lateral/directional stability. Thrust is provided by two pod-mounted PW305A turbofan engines manufactured by Pratt and Whitney Canada, Inc. Independent fuel systems supply fuel to the engines with fuel storage available in wing and fuselage tanks. Engine-driven hydraulic pumps supply hydraulic power for braking, extending and retracting the landing gear, wing flaps, and spoilers. The landing gear system is a fully retractable tricycle-type gear with dual main-gear wheels, anti-skid braking, and nose-wheel steering. The flight controls are manually controlled through cables, bellcranks, pulleys, and push-pull tubes. Lateral and directional trim is accomplished by means of electrically-actuated trim tabs installed on the left aileron and on the rudder. Longitudinal trim is accomplished by changing the angle of incidence of the horizontal stabilizer with an electrically-operated linear actuator. Aircraft air conditioning systems provide heating, cooling, and pressurization for the crew, passenger, and cabin baggage compartments.

NOTE: All dimensions shown for aircraft in static position.



AIRPLANE THREE-VIEW
Figure 1-1

1. Fwd Avionics Compartment
2. Stall Warning Vane
3. Pitot-Static Tube
4. Lower Cabin Entry Door
5. Upper Cabin Entry Door
6. Inboard Wing Stall Fence
7. Boundary Layer Energizers
8. Outboard Wing Stall Fence
9. Wing Fuel Filler Cap
10. Wing Navigation Light
11. Aft Baggage Compartment Door
12. Tailcone Compartment Access Door
13. Rudder
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15. Tail Navigation Light
16. Tail Strobe/Beacon
17. Recognition Light
18. Ram Air Inlet
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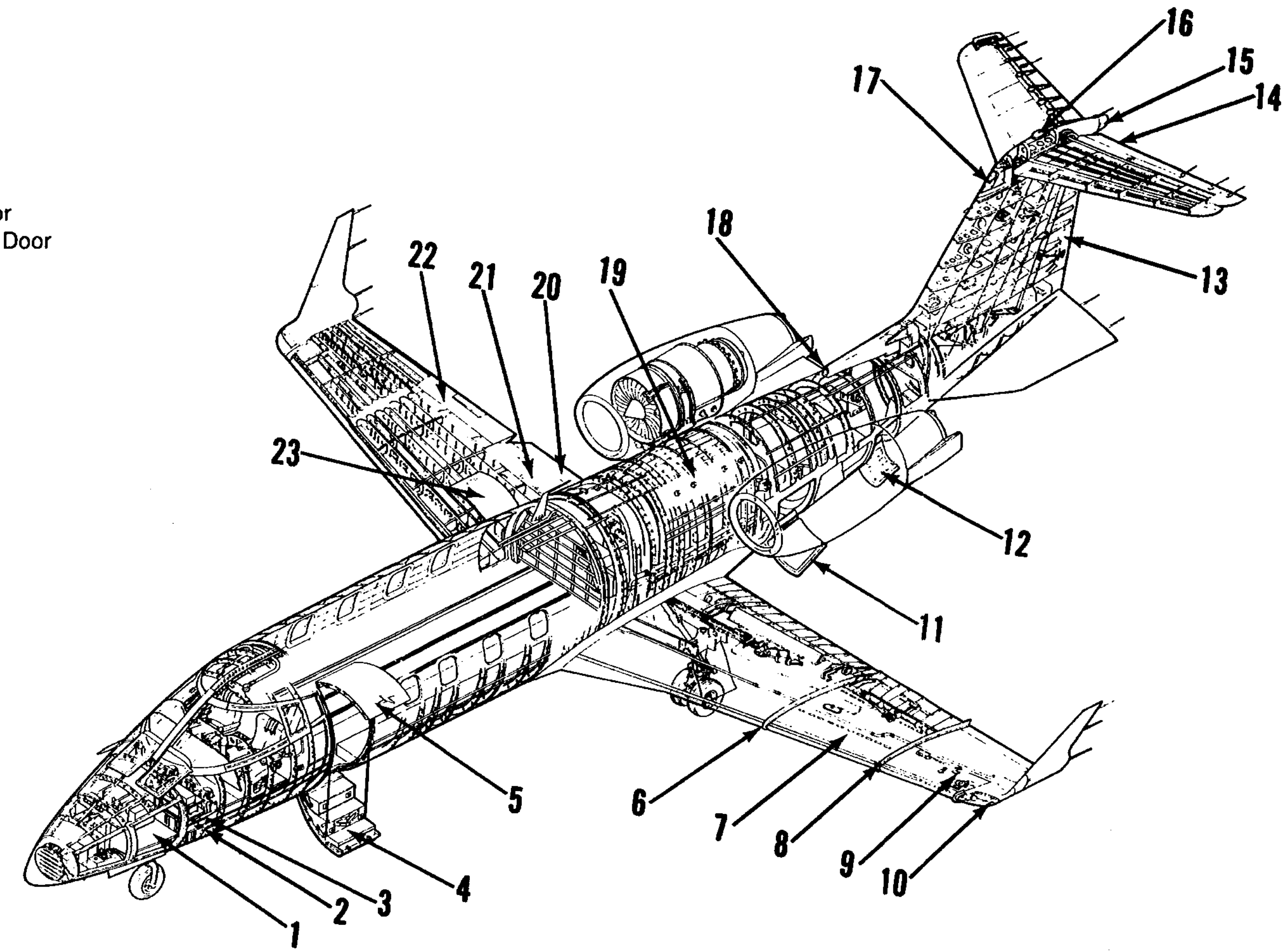
20. Flap
21. Spoiler/Spoileron
22. Aileron
23. Emergency Exit/Baggage Door



14-223C

GENERAL ARRANGEMENT — EXTERIOR
Figure 1-2

CABIN ENTRY DOOR

The cabin door consists of an upper portion that forms a canopy when open and a lower portion with integral steps. On some aircraft the upper portion has a torsion bar to provide opening assistance. On other aircraft the upper portion has gas-charged struts (gas springs) installed to assist in door opening. A latch, when over centered, retains the door in the open position. A door release handle, located on the aft door frame, mechanically releases the latch to allow the upper door to close. On some aircraft a damper is attached to the torsion bar linkage to soften door opening and closing movements. On other aircraft the gas-charged struts provide a dampening effect to soften door opening and closing movements. The lower portion of the door incorporates a torsion bar system to provide closing assistance. Cables attached to take-up reels are installed on the forward and aft lower door structure to aid in closing and prevent damage if the door is inadvertently allowed to drop open. A self-contained hydraulic damper is also attached to the lower door as an additional protection against dropping the door. Each door half has a locking handle which, when rotated, drives a series of locking pins into the fuselage structure and through interlocking arms secure the halves together. When the pins are engaged, the door becomes a rigid structural member. There is a secondary safety latch installation on the lower door separate from the door locking system. This installation will hold the lower door against the door frame seal, and align the locking pins with the pin holes. When the lower door is unlocked, the safety latch will keep the door from falling open. This latch may be operated from either inside or outside the aircraft. A key lock is provided on the upper door to secure the aircraft from the outside. Rotating the key lock will move a locking bar over the inside upper door handle, preventing it from rotating to the open position.

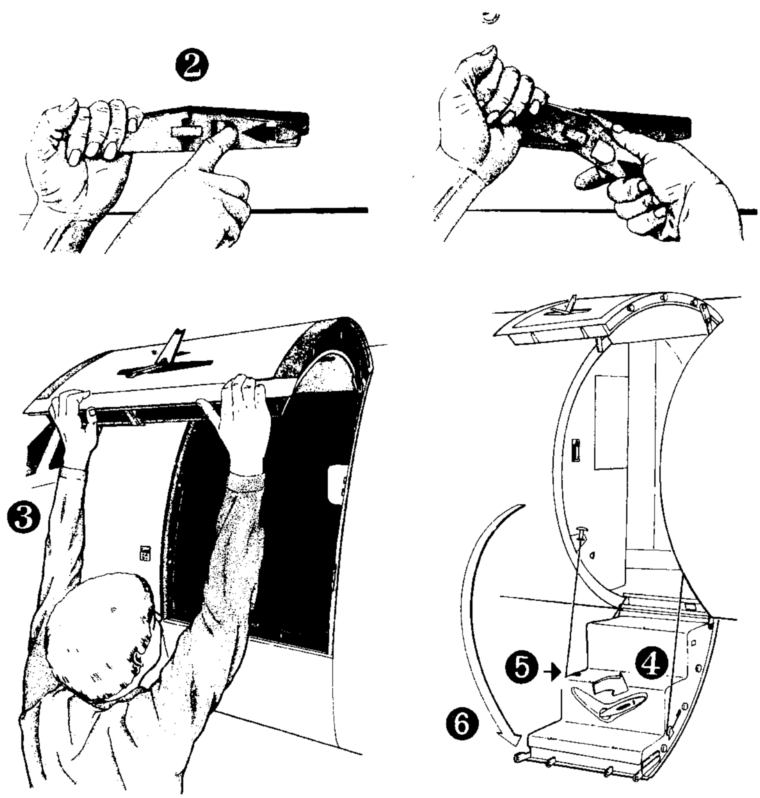
ENTRY DOOR LIGHT

A red ENTRY DOOR warning light is installed on the glareshield annunciator panel to provide the crew with visual indication of cabin door security. The light will illuminate and flash to indicate that one or more of the locking pins is not fully engaged or that the key lock is in the locked position. The light will illuminate steady when the entry door is full open and power is on the aircraft. If all pins are fully engaged, and the locking bar is recessed, the most probable cause for illumination is a switch malfunction or misalignment.

CABIN DOOR OPERATION

To open the cabin door from the outside:

1. Insert key in key lock and rotate. The key lock will retract the upper door handle locking bar.
2. Insert finger in the handle finger pull door and pull out handle halves. Rotate the handle halves clockwise to the stop.
3. Raise upper door to the full open position.
4. Reach inside and rotate lower door locking handle to OPEN position.
5. Release safety catch, located on forward side of middle step, from the inside, or outside using exterior button.
6. Gently lower door to the full down position.

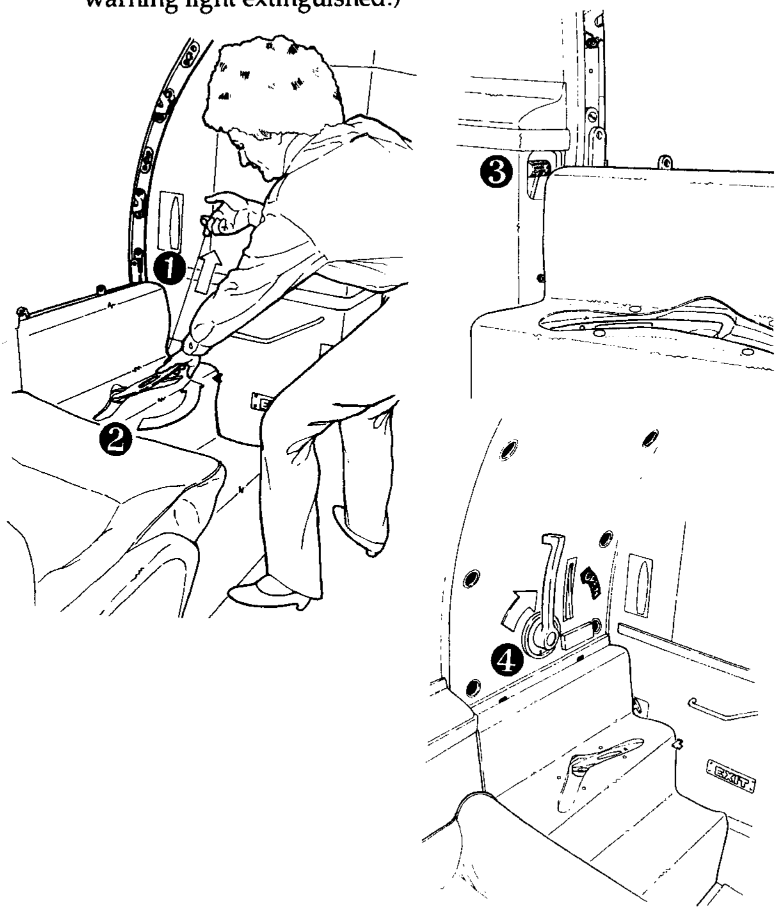


OPENING CABIN DOOR (FROM OUTSIDE)
Figure 1-3

CABIN DOOR OPERATION (CONT)

To close cabin door from inside:

1. Raise lower door, using forward cable knob, until safety latch fully engages.
2. Rotate lower door locking handle to the locked position.
3. Release upper door with door release handle on aft door frame.
4. With the upper door locking handle in OPEN position, pull door tightly against door seal and rotate locking handle to the locked position. (If preparing for flight, check ENTRY DOOR warning light extinguished.)

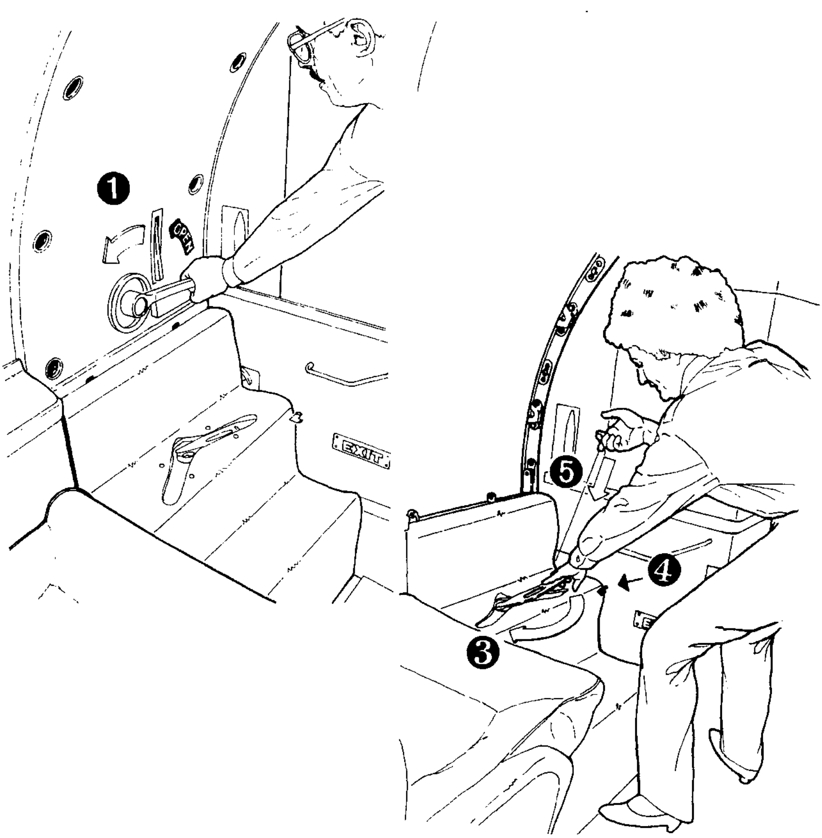


CLOSING CABIN DOOR (FROM INSIDE)
Figure 1-4

CABIN DOOR OPERATION (CONT)

To open cabin door from the inside:

1. Lift upper door locking handle to the OPEN position.
2. Push upper door outward and up to the full open position.
3. Rotate lower door locking handle to OPEN position.
4. Release safety latch, located on forward side of middle step.
5. Gently lower the lower door to full down position using the forward cable knob.

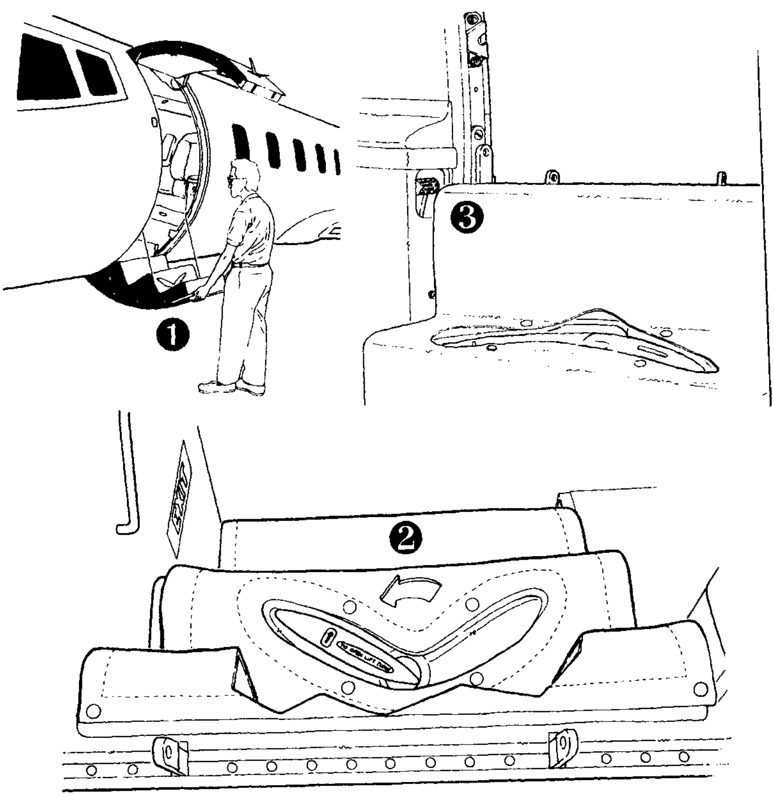


OPENING CABIN DOOR (FROM INSIDE)
Figure 1-5

CABIN DOOR OPERATION (CONT)

To close and lock cabin door from the outside:

1. Raise lower door until the safety latch fully engages.
2. Reach inside and rotate lower door locking handle to the locked position.
3. Release upper door with door release handle on aft door frame.
4. With upper door locking handle in the OPEN position, gently lower upper door and push tightly against door frame.
5. Rotate exterior handle halves counterclockwise to the stop and ensure each half recesses into door structure.
6. Insert key in key lock and rotate. This will extend the upper door locking bar over the locking handle.



CLOSING CABIN DOOR (FROM OUTSIDE)
Figure 1-6

EMERGENCY EXIT/BAGGAGE DOOR

The emergency exit/baggage door, located on the aft right side of the cabin, serves a dual function. It provides egress from the cabin during emergencies and access from the outside to the aft cabin baggage area. The door is attached to the airframe by hinges at the top and secured by locking pins at the side and lower edge. The door structure incorporates a window similar to those installed in the cabin. Gas-charged struts (gas springs) are installed to assist in door opening and closing and to hold the door open when fully extended. For security on the ground, the inner door latching handle has a red streamered locking pin installed through a hole in the handle to restrict movement. This pin must be removed before every flight.

AFT CAB DOOR LIGHT

To provide cockpit visual indication as to the flight status of the emergency exit/baggage door, a red AFT CAB DOOR warning light is installed on the glareshield annunciator panel. The light will illuminate and flash if the locking pins are not fully engaged, the handle mechanism is not in the latched position, or the red streamered locking pin has not been removed for flight. The light will illuminate steady when the handle is at the full open position. If all components are found to be properly positioned, a switch malfunction or misalignment is the probable cause for illumination.

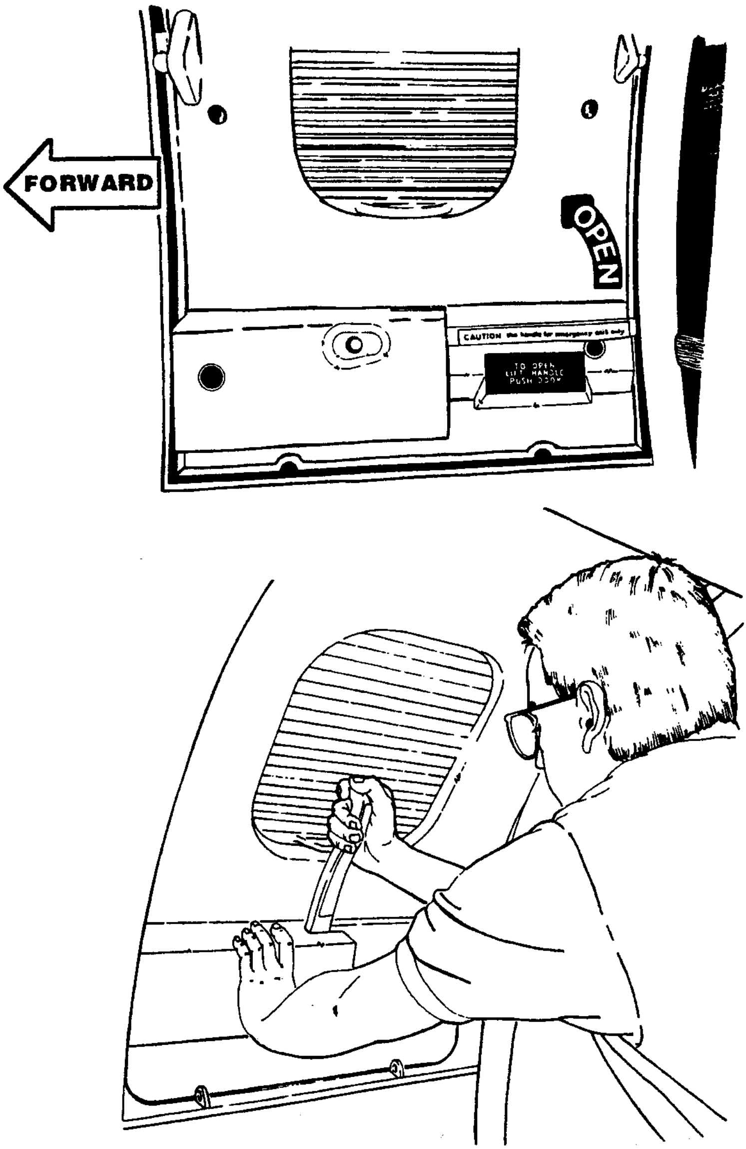
EMERGENCY EXIT/BAGGAGE DOOR OPERATION

To open the emergency exit/baggage door from the inside:

1. Remove red streamered locking pin.
2. Rotate locking handle to the OPEN position.
3. Push door outward and up to the full open position.

To close the emergency exit/baggage door from the inside:

1. With the door locking handle in the OPEN position, gently lower the door.
2. Pull door tight against door seal and rotate the locking handle to the locked position.
3. If preparing for flight, no further action is required except to check AFT CAB DOOR warning light extinguished. If securing door on the ground, rotate pin cover knob and insert red streamered locking pin.

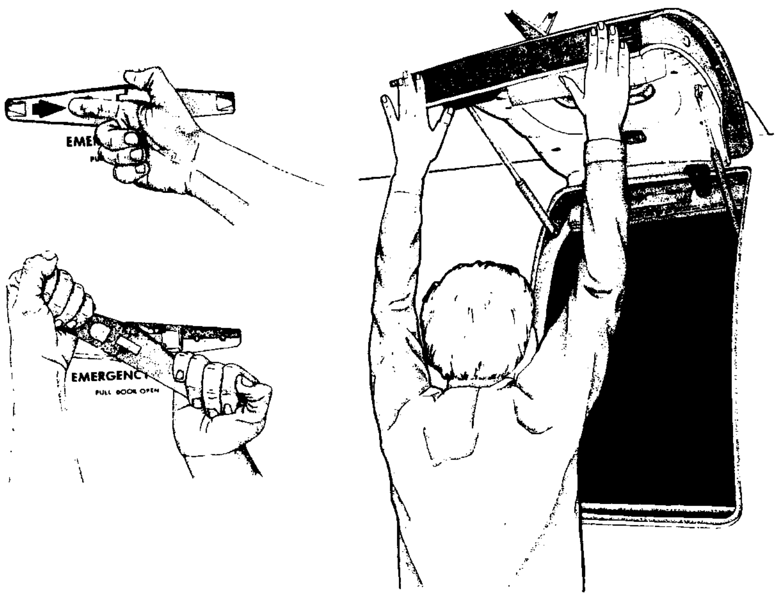


EMERGENCY EXIT/BAGGAGE DOOR OPERATION
Figure 1-7

To open emergency exit/baggage door from the outside:

1. Insert finger in the handle finger pull door and pull out handle halves. Rotate the handle halves clockwise to the stop.
2. Raise door upward to the full open position.

NOTE Stand clear if there is a chance the cabin is still pressurized.



EMERGENCY EXIT/BAGGAGE DOOR OPERATION
Figure 1-7A

To close the emergency exit/baggage door from the outside:

1. With the door locking handle in the OPEN position, gently lower the door and push tightly against door frame.
2. Rotate exterior handle halves counterclockwise to the stop and ensure each half recesses into door structure.
3. If preparing for flight, no further action is required except to check AFT CAB DOOR warning light extinguished.

EXTERNAL DOORS

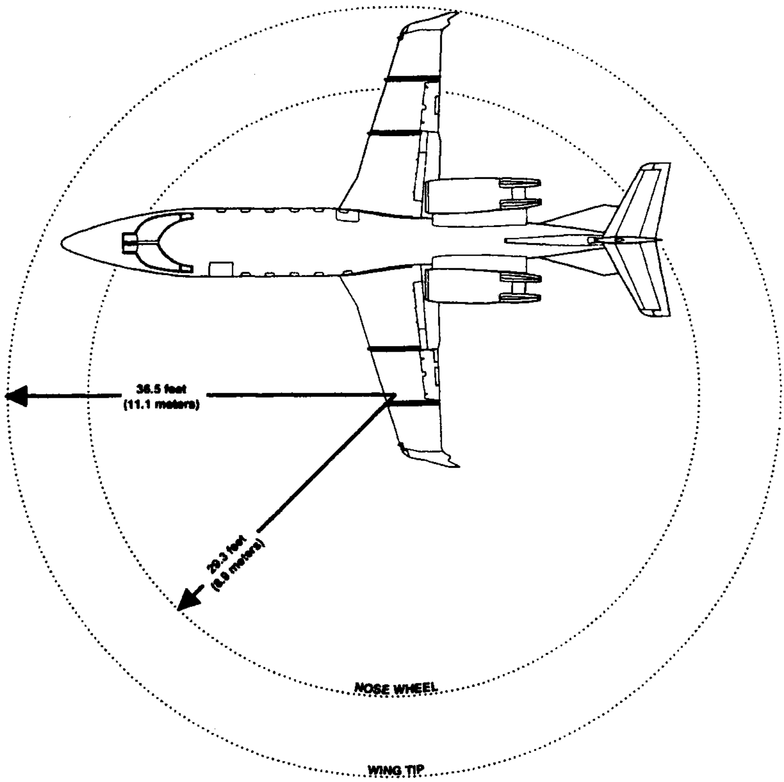
External doors are installed to provide for baggage loading and maintenance access. The nose area forward of the cockpit is accessible through four doors — two on the left side and two on the right side. The tailcone is accessible through the tailcone access door and aft baggage door, both located on the left side. Two doors provide access to the single-point pressure refueling system. These doors are located side by side on the right side of the fuselage beneath the right engine. Access to the external servicing provisions for the toilet is through a door on the underside of the fuselage below the potty.

EXT DOORS LIGHT

Illumination of the red EXT DOORS warning light, located on the glareshield annunciator panel, indicates the tailcone access door and/or the aft baggage door is not properly closed and latched. The primary purpose of the light is to indicate a door open condition prior to takeoff. If the doors were properly latched prior to takeoff and the light illuminates in flight, the most probable cause is a switch failure.

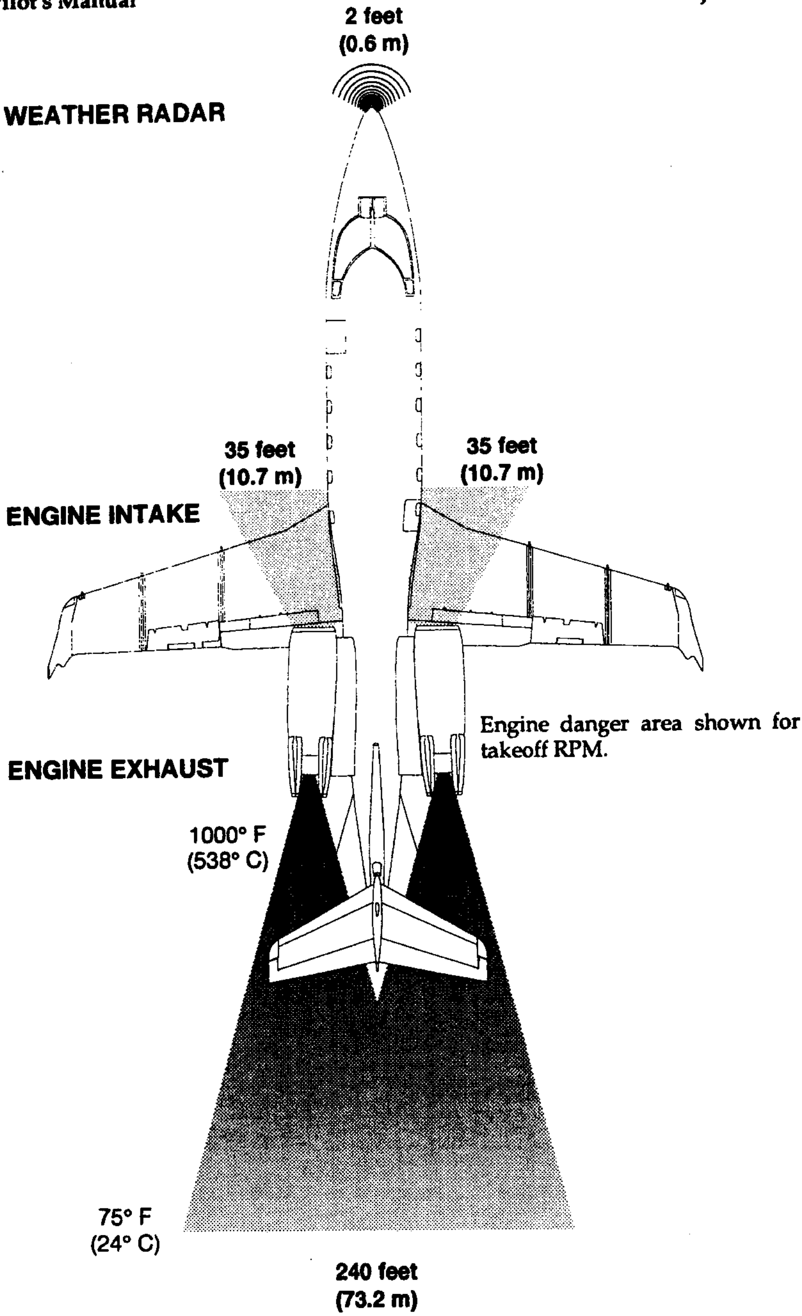
TAILCONE BAGGAGE COMPARTMENT

The tailcone baggage compartment is accessed through a door located under the left engine pylon. A slight pressure differential (0.25 psi) is maintained to prevent fluids from entering the compartment. The pressure is provided by ram air entering the dorsal inlet. An outflow valve, located on the top of the baggage compartment, controls the pressure.

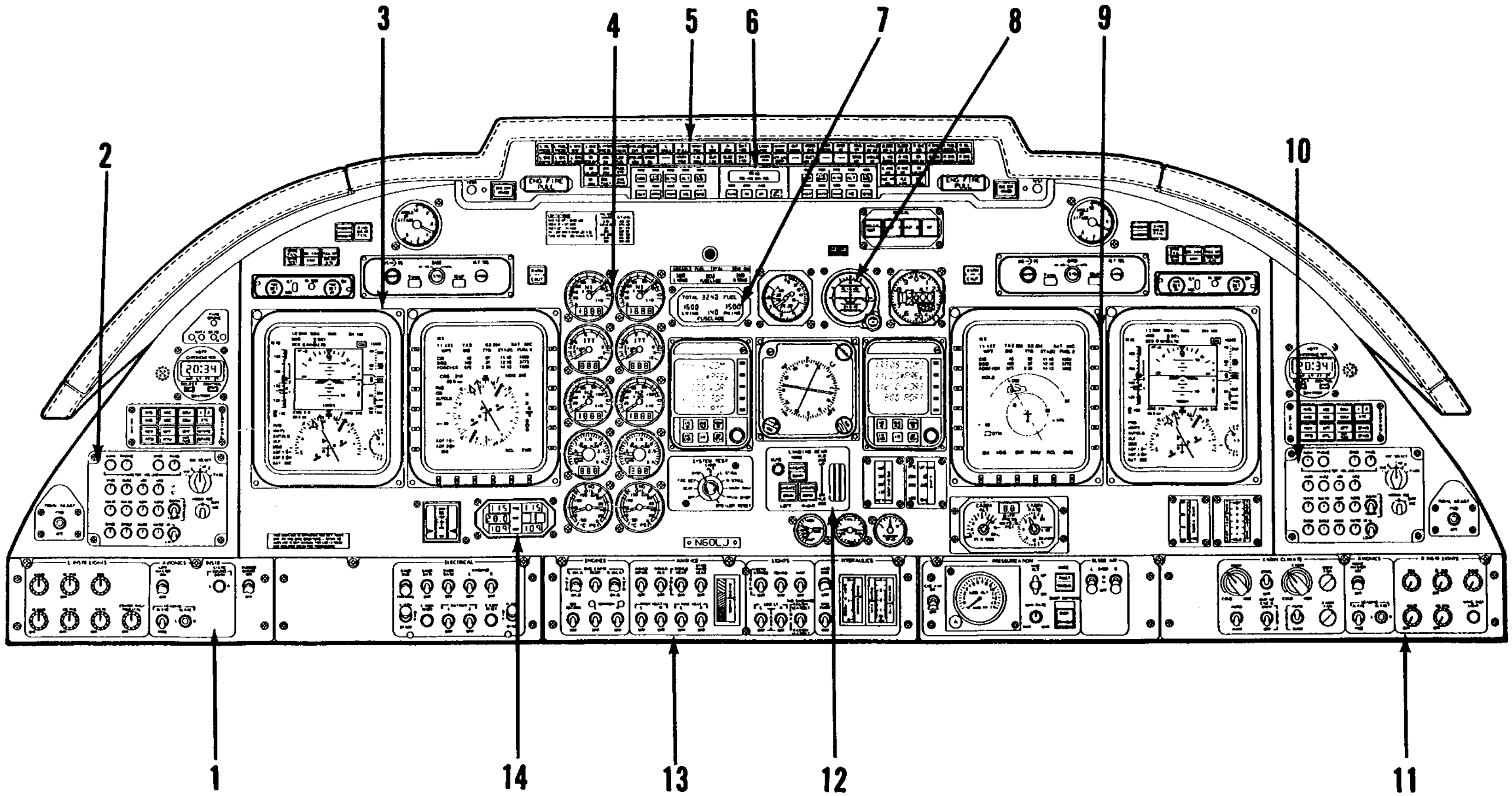


NOTE: Turning radius expressed above is based upon 60° nose wheel travel (full-authority/low-speed steering). Limited authority steering provides 24° of nose wheel travel. Turning radius will increase accordingly.

TURNING RADIUS
Figure 1-8



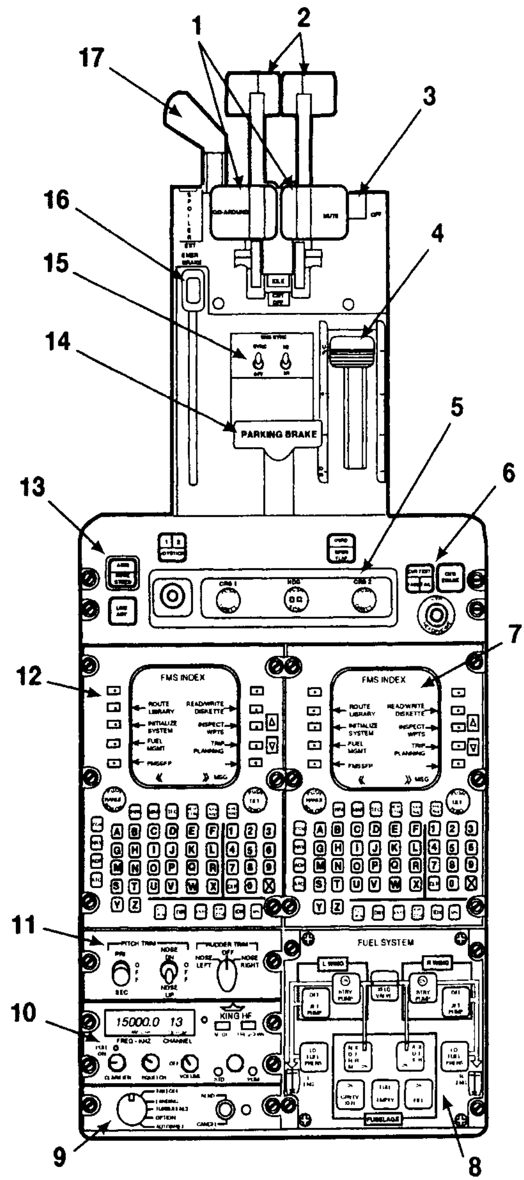
DANGER AREAS
Figure 1-9



1. Pilot's Switch Panel
2. Pilot's Audio Control Panel
3. Pilot's Flight Instruments & Controls
4. Engine Instruments
5. Annunciator Panel
6. Flight Control Panel (FCP)
7. Fuel Quantity Indicator
8. Standby Instruments
9. Copilot's Flight Instruments & Controls
10. Copilot's Audio Control Panel
11. Copilot's Switch Panel
12. Landing Gear Control Panel
13. Center Switch Panel
14. Electric Power Monitor

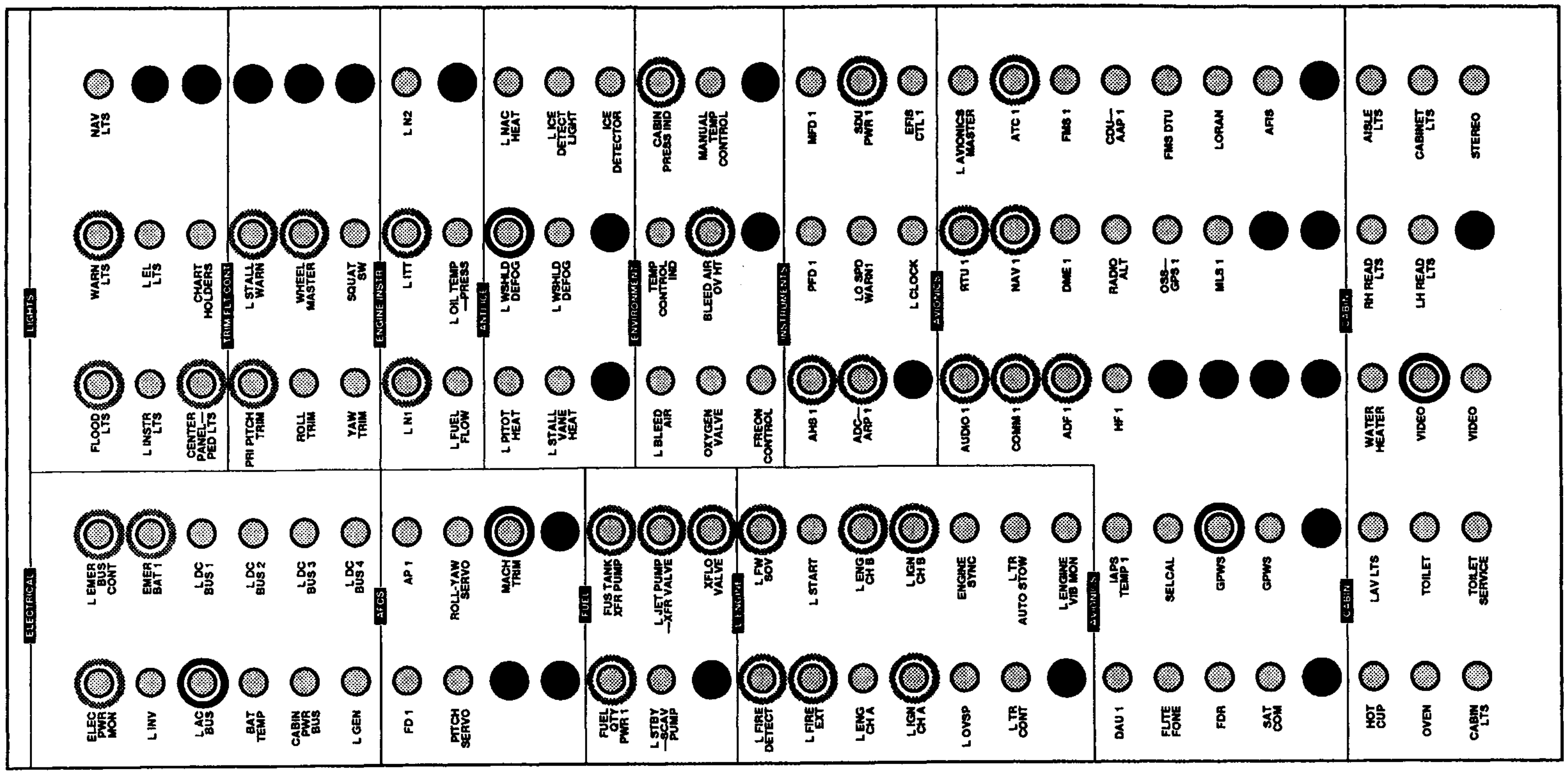
16-125B

INSTRUMENT PANEL (TYPICAL)
Figure 1-10



1. Thrust Levers
2. Thrust Reverser Levers
3. APR Switch (Recessed)
4. Flap Switch
5. Course & Heading Panel
6. CVR Controls
7. #2 Control Display Unit
8. Fuel Control Panel
9. Passenger Briefer Controls
10. HF Comm Control Head
11. Trim Control Panel
12. #1 Control Display Unit
13. Nose Steer Switch
14. Parking Brake Handle
15. Engine Sync Switches
16. Emergency Brake Handle
17. Spoiler Lever

PEDESTAL (TYPICAL)
Figure 1-11



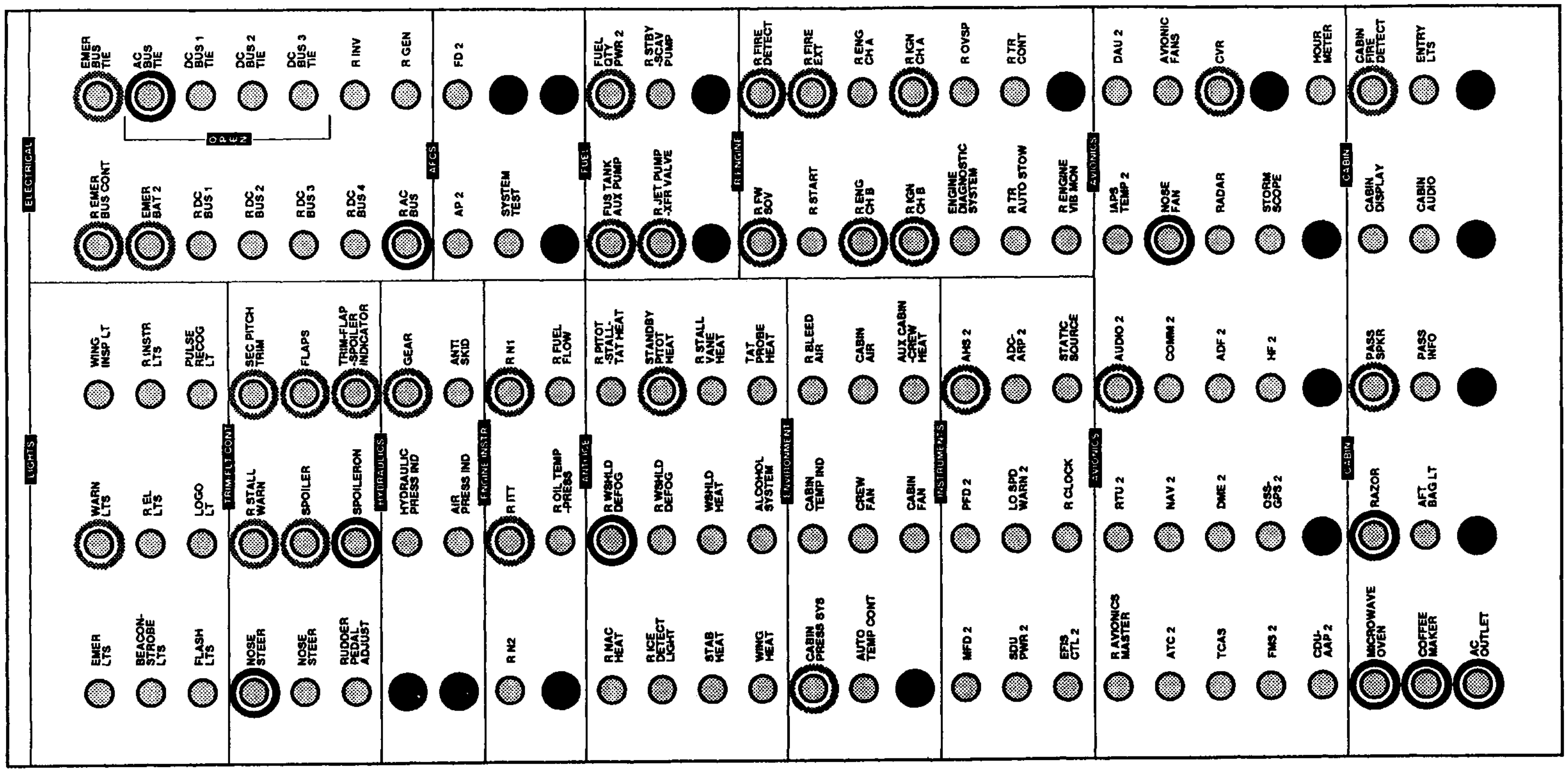
Denotes DC circuit breakers

Denotes AC circuit breakers

Denotes circuit breakers on the emergency bus

Denotes unused circuit breaker positions

PILOT'S CIRCUIT BREAKER PANEL (TYPICAL)
Figure 1-12



Denotes DC circuit breakers

Denotes AC circuit breakers

Denotes circuit breakers on the emergency bus

Denotes unused circuit breaker positions

COPILOT'S CIRCUIT BREAKER PANEL (TYPICAL)
Figure 1-13

SECTION II
ENGINES & FUEL

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SECTION II
ENGINES & FUEL

ENGINES

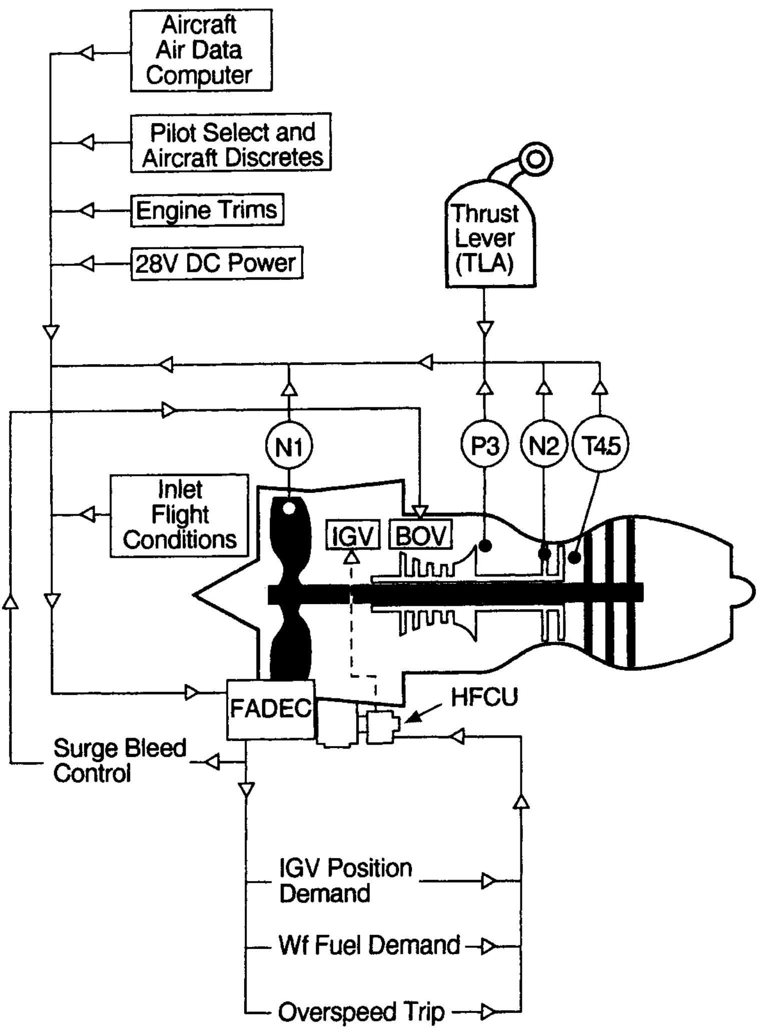
The Learjet Model 60 is powered by two PW305A Pratt and Whitney two-spool, front-fan engines. Each engine is rated at 4600 pounds thrust at sea level.

A spinner and an axial-flow fan, located at the forward end of the engine, are driven by the low-pressure rotor. The low-pressure rotor consists of an axial-flow fan (low-pressure compressor) and a three-stage low-pressure axial turbine, mounted on a common shaft. The high-pressure rotor consists of a high-pressure compressor (four axial stages and a single centrifugal stage) and a two-stage high-pressure axial turbine, mounted on a common shaft. The rotor shafts are concentric, so that the low-pressure rotor shaft passes through the high-pressure rotor shaft. The high-pressure rotor drives the accessory gearbox through a driveshaft geared to the N_2 rotor shaft.

An annular duct serves to bypass fan air for direct thrust and also diverts a portion of the fan air to the high-pressure compressor. The bypass ratio (bypass flow to core flow) is 4.55 : 1. Air from the low-pressure compressor flows through variable inlet guide vanes and first-stage variable stator vanes to the high-pressure compressor and is discharged into the annular combustor. Combustion products flow through the high- and low-pressure turbines and are discharged axially through the exhaust duct to provide additional thrust.

ENGINE FUEL AND CONTROL SYSTEM

The engine fuel and control system pressurizes fuel routed to the engine from the aircraft fuel system, meters fuel flow, and delivers atomized fuel to the combustion section of the engine. The system also supplies high-pressure motive-flow fuel to the aircraft fuel system for jet pump operation. The major components of the system are the thrust levers, the engine-driven fuel pump, the hydro-mechanical fuel control unit (HFCU), the full authority digital electronic control (FADEC), variable inlet guide vanes, variable stator vanes, and the surge bleed control.



ENGINE CONTROL LOGIC DIAGRAM
Figure 2-1

THRUST LEVERS

Two thrust levers (one for each engine) are located on the upper portion of the pedestal, and operate in a conventional manner with the full forward position being maximum thrust. Stops at the IDLE position prevent inadvertent reduction of the thrust levers to CUT-OFF. The IDLE stops can be released by lifting a finger lift on the outboard side of each thrust lever. Detents are provided for CUT-OFF, IDLE, maximum cruise (MCR), maximum continuous thrust (MCT), takeoff (TO), and automatic performance reserve (APR). Each thrust lever is mechanically linked to a rotary variable differential transformer (RVDT) position transducer. The RVDT provides dual electrical signals to the FADEC which correspond to the thrust lever angle (TLA). A switch, which actuates in the CUT-OFF position, provides a discrete signal to the FADEC to initiate the normal shutdown sequence.

ENGINE-DRIVEN FUEL PUMP

The engine-driven fuel pump provides high-pressure fuel to the engine fuel control system as well as motive-flow fuel for operation of the aircraft jet pumps. The pump consists of a low-pressure pump element, high-pressure pump element, relief valve, and motive flow provisions. The pump itself is housed in the hydro-mechanical fuel control unit. Fuel from the low-pressure element passes through a filter before it enters the high-pressure element. In the event the pressure differential across the fuel filter increases to a preset level, the impending bypass indicator will actuate and the white ENG FILTERS light will illuminate. If the pressure differential continues to increase, due to clogging, the filter bypass valve will open to allow fuel to bypass the filter.

HYDRO-MECHANICAL FUEL CONTROL UNIT

The hydro-mechanical fuel control unit (HFCU) mounts to the permanent magnet alternator on the aft side of the accessory gearbox. The HFCU's main function is to control fuel flow to the engine's fuel nozzles. Fuel flow is regulated in response to commands from the FADEC which computes the necessary settings for the existing conditions. The HFCU also provides servo pressure to the variable guide vane actuator, houses the engine-driven fuel pump, and provides fuel pressure regulation.

FULL AUTHORITY DIGITAL ELECTRONIC CONTROL

A full authority digital electronic control (FADEC), is installed in a bracket on each engine. Each FADEC has two channels (A and B) each fully capable of controlling the engine. During normal operation (ENG CMPTR switch in AUTO), the most capable channel is automatically selected to control the engine. FADEC functions include:

- Thrust Management
- Overspeed Protection
- Bleed-Off Valve Control
- Automatic Performance Reserve
- Inlet Guide Vane & Inlet Stator Vane Control
- Igniter Operation
- Surge Protection
- Fault Detection
- N1 Bug Setting
- Engine Synchronization
- Starting & Shutdown Control
- Digital ITT

The crew is able to control the engine through the FADEC by changing the TLA input to change desired thrust level. The FADEC receives input from several engine sensors and the aircraft's air data computers and together with the TLA input it determines the appropriate signals to send to the HFCU, the inlet guide vane and stator vane actuator, and the bleed-off valve solenoid to achieve the desired engine operation. The aircraft's air data computers provide inlet static pressure (PAMB) and Mach number as primary signals to the FADEC. PAMB and Mach number are also measured by the FADEC transducer but used only as a backup to the air data computer signals. Sensors on the engine provide inlet total temperature (TT0) signals to the FADEC. A TT0 signal is provided by the air data computer, but used only as a backup to the engine sensor signals. Electrical power is supplied by an engine-driven permanent-magnet alternator. Backup power and power for starting is provided through the ENG CH A and ENG CH B circuit breakers on the pilot's and copilot's circuit breaker panels. *On aircraft 60-001 thru 60-128 not modified by SB 60-76-2 (Replacement of LH and RH FADEC Wiring Harness)*, backup power is available to channel B during EMER BUS mode. *On aircraft 60-129 and subsequent and prior aircraft modified by SB 60-76-2*, backup power is available to channel A during EMER BUS mode.

ENG CMPTR SWITCHES

Two switches, one for each engine, on the center switch panel labeled ENG CMPTR CH. A/AUTO/CH. B enable the flight crew to select the FADEC channel (A or B) to be used to control the engine. Normally, the switches are left in the AUTO position which allows the FADEC to automatically select the most capable channel. During abnormal situations, the crew may use this switch to force the desired channel to take control of the engine.

On aircraft 60-001 thru 60-128 ***not*** *modified by SB 60-76-1 (Removal of Engine FADEC Reset Switch)*, a single ENG CMPTR RESET switch, on the center switch panel, is used to clear malfunctions and reset the FADEC. To reset the FADEC, the switch is held left or right (as applicable) for approximately 2 seconds. If the malfunction clears, the ENG CMPTR light(s) will extinguish. The reset switch is not operational on the ground. *On aircraft 60-129 and subsequent and prior aircraft modified by SB 60-76-1*, the ENG CMPTR RESET switch has been removed.

ENG CMPTR LIGHTS

Two ENG CMPTR lights are provided for each engine and reside in the annunciator panel. One light is white and one is amber. Illumination of a white light indicates a minor malfunction in one or both channels of the associated FADEC. Illumination of an amber light indicates a major malfunction in one channel of the associated FADEC. Illumination of both the white and amber lights indicates a malfunction in both channels of the associated FADEC. Dispatch is **not** permitted with any white or amber light illuminated.

VARIABLE INLET GUIDE VANES AND VARIABLE STATOR VANES

The engine is equipped with variable inlet guide vanes to direct air into the first stage axial compressor and variable stator vanes to direct air into the second stage axial compressor. This feature permits peak compressor efficiency throughout various operating conditions. A variable guide vane actuator is used to simultaneously position the guide vanes and stator vanes. The FADEC computes the desired vane position and commands the HFCU to provide servo pressures (fuel) to the actuator which positions the vanes. A rotary variable differential transformer (RVDT) position transducer, mounted on the actuator, sends an electrical feedback signal to the FADEC.

SURGE BLEED CONTROL

Each engine has a surge bleed control system which allows surge free operation throughout various operating conditions and improves engine starting characteristics. The system consists of a solenoid control valve and three bleed-off valves (BOV). Two valves bleed compressor air from station 2.5 while the third valve bleeds air from station 2.8. BOV position is controlled by the FADEC via the solenoid control valve. Compressor discharge air (P_3) is used to provide servo pressure to close the bleed-off valves. The solenoid control valve applies P_3 pressure to the BOVs to close them and vents P_3 pressure to open them. In the event a solenoid control valve fails, the bleed-off valves will go to the open position.

AUTOMATIC PERFORMANCE RESERVE (APR)

The APR system provides for an automatic change from the takeoff N1 rating to the APR rating for the operative engine in the event of loss of thrust from one engine during takeoff. The amount of thrust change will depend on ambient conditions. Since the engines installed on the Learjet 60 are flat rated, the difference between takeoff and APR thrust will be very small under some ambient conditions. The system consists of an APR switch on the forward pedestal, APR ARM and APR ON lights on the glareshield, and associated aircraft wiring. To detect loss of thrust, the Full Authority Digital Electronic Control (FADEC) continuously monitors the opposite engine's N1 and N2 signals. Loss of thrust is defined by the FADECs as meeting one or more of the following criteria:

- The N1 of one engine differs more than 15% from the N1 of the other engine.
- The N2 of one engine differs more than 7.5% from the N2 of the other engine.
- The N1 of one engine differs more than 4% from the N1 of the other engine and N1 is decreasing at a rate greater than 5% per second.
- The N2 of one engine differs more than 2% from the N2 of the other engine and N2 is decreasing at a rate greater than 2% per second.

APR SWITCH

APR system automatic operation is pilot controlled through the APR ARM-OFF switch located on the right side of the pedestal adjacent to the thrust levers. The switch is recessed to prevent inadvertent APR activation. The switch has two positions: OFF and ARM. For automatic operation the switch is set to ARM. When ARM is selected, the APR ARM light will illuminate provided no faults exist which affect the APR function. When a loss of thrust is detected by one of the FADECs, an uptrim of the operative engine is commanded. The FADEC checks that the change to the appropriate APR N1 setting has been triggered and if it has, the APR ON light will illuminate. Should automatic activation of APR fail to occur, APR thrust can be manually obtained by setting the thrust lever to the APR detent. In this case, the APR ON light will not illuminate. Once invoked, the APR thrust schedule will remain active until the APR switch is set to OFF.

APR ARM LIGHT

The green APR ARM light on the glareshield annunciator panel will illuminate when the APR switch is in the ARM position provided no faults exist which affect the APR function.

APR ON LIGHT

If APR is activated automatically by the FADEC, the amber APR ON light on the glareshield annunciator panel will illuminate once APR thrust has been achieved. The APR ON light will not illuminate if APR thrust is obtained manually using the thrust lever detent.

ENGINE SYNCHRONIZER

The engine synchronizer system consists of two ENG SYNC switches, an amber ENG SYNC light, and engine synchronizer circuits within the FADECs. During flight, the engine synchronizer, if selected, will maintain the two engines' N1 or N2 in sync with each other. The engine synchronizer must not be used during takeoff, landing, or single-engine operations. Engine synchronization is not available on the ground or whenever APR is armed. Electrical power for the engine synchronizer is 28 VDC supplied through the 1-amp ENGINE SYNC circuit breaker on the pilot's circuit breaker panel.

Synchronization is accomplished by maintaining the speed of the slave engine in sync with the speed of the master engine. The master engine is determined and so designated during installation. The following criteria must be satisfied before the system will operate:

- The ENG SYNC switch is set to SYNC.
- The difference between the N1 speed of each engine is no more than 5%.
- Thrust levers are in the range from IDLE to MCT.
- Thrust reversers are stowed.
- APR is disarmed.

Deviating from any of these criteria will cancel engine synchronization. The system will raise flight idle of the master engine by a maximum of 1% N1 when activated.

ENG SYNC SWITCHES

Two ENG SYNC switches are installed on the pedestal immediately below the thrust levers. The ENG SYNC control switch is labeled SYNC-OFF and the ENG SYNC selector switch is labeled N1-N2. When moved to the SYNC position, the control switch will activate the engine synchronizer and remove N1 Indicator compensation; therefore, the N1 and N1 bug presentations will reflect actual N1 speed. When SYNC is selected, N1 or N2 synchronization is selected by moving the ENG SYNC selector switch to N1 or N2 as desired.

ENG SYNC LIGHT

The amber ENG SYNC light on the glareshield annunciator panel will be illuminated when the nose gear is not up and the SYNC-OFF switch is in the SYNC position.

GROUND IDLE SYSTEM

The ground idle system provides reduced engine idle speeds for ground operations. When the thrust lever is in the IDLE detent and the squat switch is in the ground mode, idle speed is reduced from approximately 65% N_2 (flight idle) to approximately 52% N_2 (ground idle). In flight, the idle speed setting is selected to ensure adequate transient response to full takeoff power. The system incorporates a 10-second delay after touchdown before ground idle is activated.

ENGINE OIL SYSTEM

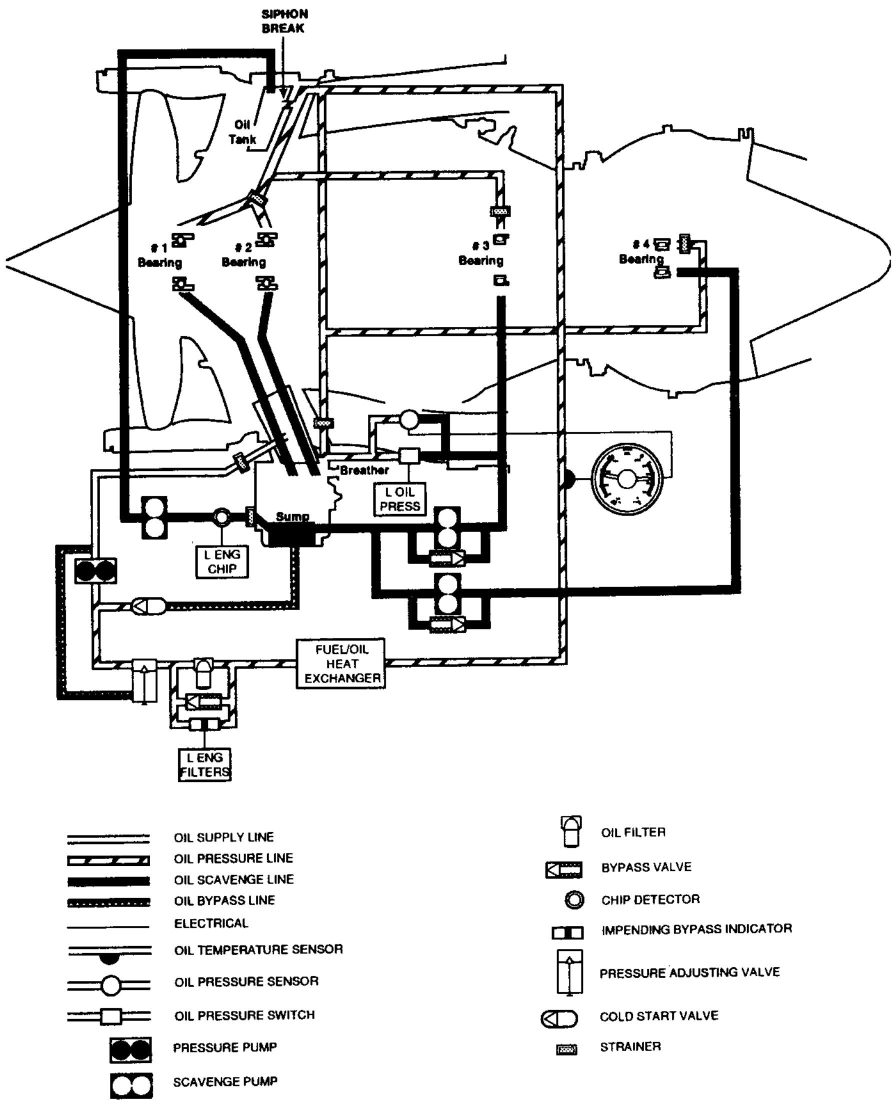
The engine oil system provides lubrication and cooling for the main-shaft bearings, all accessory drive gears and all accessory bearings. The system consists of a pressure system, a scavenge system, and a breather system.

PRESSURE SYSTEM

The oil tank is an integral part of the engine intermediate case. Oil is drawn from the tank by a gear-type pressure pump. Pump output is directed through a pressure adjusting valve which bleeds excess pressure back to the pump inlet. From there, oil passes through an oil filter and fuel/oil heat exchanger before being routed to the mainshaft bearings, accessory drive gears, and accessory bearings. A cold-start valve diverts oil from the pump outlet into the accessory gearbox sump if pressure exceeds 200 psi during cold weather operation.

The oil filter incorporates a bypass valve allowing oil to bypass the filter should it become clogged. An impending bypass indicator provides both a pop-up type visual indicator and an electrical signal to activate the ENG FILTERS light in the cockpit. To avoid false indications at engine start-up with cold oil, a thermal lockout inhibits the impending bypass indication if oil temperature is below 38° C (100° F).

An anti-siphon device is incorporated to prevent oil from being siphoned out of the oil tank following engine shutdown. The device contains a small hole drilled through to the expansion space at the top of the oil tank. This breaks the siphon action caused by the oil tank level being higher than the main bearing oil jets.



ENGINE OIL SYSTEM SCHEMATIC
Figure 2-2

SCAVENGE SYSTEM

The scavenge system incorporates three gear-type scavenge pumps installed in the accessory gearbox. Oil from the number 1 and 2 bearing compartments drains by gravity into the accessory gearbox sump. Oil from number 3 and 4 bearings is pumped by scavenge pumps into the accessory gearbox sump. Scavenge flow from all bearing compartments is aided by pressurizing airflow through the labyrinth air seals. Bypass valves are incorporated around the number 3 and 4 bearing scavenge pumps to prevent pressure build-up in the scavenge lines at higher bearing cavity pressure conditions. Oil collected in the accessory gearbox sump is pumped to the top of the oil tank by a separate scavenge pump.

BREATHER SYSTEM

Air from the bearing compartments, accessory gearbox, and oil tank is vented overboard through an impeller-type centrifugal air/oil separator installed in the accessory gearbox.

ENGINE IGNITION SYSTEM

Each engine ignition system consists of an IGNITION switch, a green annunciator, two ignition exciter units, two shielded cables, two igniter plugs, and associated aircraft wiring. The ignition exciter unit is a solid-state, high-voltage unit which provides a spark rate of 1 to 4 sparks per second at an output of 24,000 to 35,000 volts. The igniter plugs are mounted at four and five o'clock positions in the combustion chamber case. The plugs are operated by separate cables and spark when pulsed by the ignition exciter units. During the start cycle, the ignition system is automatically energized by the FADEC when the thrust levers are placed in the IDLE position and N2 is above approximately 6%. The ignition system is automatically de-energized by the FADEC at approximately 40% N2. At pressure altitudes below 20,000 feet and TLA at or above IDLE, the FADEC will sequence the ignition system on should N2 speed fall below 40%. This feature provides for an immediate relight when the aircraft is below 20,000 feet. The ignition system may be operated continuously through the corresponding IGNITION switch. The ignition system light will be illuminated whenever the associated ignition system is operating either continuously (IGNITION On) or automatically (FADEC control). The ignition system is powered by 28 VDC from the L and R IGN CH A and IGN CH B circuit breakers on the pilot's and copilot's circuit breaker panels. The ignition system is operative during EMER BUS mode.

IGNITION SWITCHES

The IGNITION switches, located on the center switch panel, are used to obtain continuous engine ignition. The switch controlling the left engine ignition system is labeled L-OFF. The switch controlling the right engine ignition system is labeled R-OFF. When an IGNITION switch is placed in the On (L or R as applicable) position, 28 VDC from the corresponding L or R IGN CH A and IGN CH B circuit breakers is applied to the corresponding ignition exciter units.

IGNITION LIGHTS

Green lights above each IGNITION switch are installed to indicate ignition system operation. The corresponding light will be illuminated when the associated ignition system is operating either continuously (IGNITION On) or automatically (FADEC control).

ENGINE INDICATING

ENGINE OIL INDICATOR (Pressure and Temperature)

An ENG OIL indicator, to indicate the oil pressure and temperature, is provided for each engine. The instruments are located on the center instrument panel. The indicator face is divided into two semi-circular scales — one for pressure and one for temperature. Each scale has a separate pointer. The pressure scale ranges from 0 to 220 psi. The temperature scale ranges from -50°C to 150°C. The temperature pointer is operated by a resistance-type temperature sensor in an oil pressure line on the respective engine. The pressure pointer is operated by a pressure transducer which senses the pressure differential between the oil scavenge line and the oil pressure line. Electrical power for system operation is 28 VDC supplied through the 2-amp L and R OIL TEMP—PRESS circuit breakers on the pilot's and copilot's circuit breaker panels. Refer to Airplane Flight Manual for instrument limit markings.

OIL PRESSURE LIGHTS

Red L OIL PRESS and R OIL PRESS warning lights are installed in the glareshield annunciator panel. In the event that either engine's oil pressure drops below approximately 20 psi, a pressure switch connected to the oil pressure line and oil scavenge line of the affected engine will cause the applicable light to illuminate. Also, the applicable light will be illuminated whenever electrical power is on the aircraft and the corresponding engine is not operating. Electrical power for system operation is 28 VDC supplied through the 7.5-amp WARN LTS circuit breakers on the pilot's and copilot's circuit breaker panels.

ENGINE CHIP LIGHTS

Illumination of either amber L ENG CHIP or R ENG CHIP light indicates the presence of contaminants and debris in the corresponding engine's oil system. The lights are activated by a magnetic chip detector installed in the scavenge oil passage of each engine's accessory gear box.

ENG FILTERS LIGHT

Illumination of a white ENG FILTERS light on the glareshield annunciator panel indicates one or more of the following conditions:

- Impending bypass of the respective engine fuel filter
- Impending bypass of the respective engine oil filter
- Impending bypass of the respective airframe-mounted fuel filter

The airframe-mounted fuel filter circuit is wired through the squat switch and may cause the ENG FILTERS light to illuminate only if the aircraft is on the ground. The engine fuel filter circuit is not wired through the squat switch and may cause the ENG FILTERS light to illuminate either in flight or on the ground. A maintenance panel, installed in the tailcone, is utilized by maintenance personnel to determine the specific filter causing the ENG FILTERS light to illuminate and to reset the system after the corrective action has been taken.

ENG VIB LIGHTS

Illumination of either amber L ENG VIB or R ENG VIB light indicates an abnormally high level of vibration in the associated engine. The lights are activated by a signal conditioning box located in the tailcone. A transducer installed on a mounting pad of each engine's intermediate case provides the trigger to initiate an engine vibration caution.

FUEL FLOW INDICATOR

A FUEL FLOW indicator for each engine is installed on the center instrument panel. Each indicator utilizes both a three-place digital display and a circular scale with pointer to indicate the fuel burn rate of the respective engine. The circular scale reads from 0 to 3000 pounds per hour in 100 pound-per-hour increments. The digital display uses lighted segments to indicate fuel flow to the nearest 10 pounds per hour. A fuel-flow transmitter (flowmeter) for each engine measures fuel flow by means of a rotary vane installed in the engine fuel supply line between the hydro-mechanical fuel control unit and the fuel dump valve. As fuel flows through the flowmeter, an amplitude-modulated constant-frequency sine wave signal is generated and applied to the fuel flow indicator. The indicator converts this signal into an indication of fuel burn rate (pounds per hour). The indicator also provides a signal to the flight management system for each pound of fuel burned. The fuel flow indicating system operates on 28 VDC supplied through the 5-amp L and R FUEL FLOW circuit breakers on the pilot's and copilot's circuit breaker panels.

N_1 INDICATORS

An N_1 indicator for each engine is installed on the center instrument panel. Each indicator utilizes both a four-place digital display and a circular scale with pointer to indicate N_1. The circular scale is marked from 0% to 110% in 5% RPM increments. The digital display uses lighted segments to show the fan speed to the nearest tenth of a percent. Each indicator also has a trapezoid-shaped N_1 bug driven by a signal from the associated FADEC. The N_1 bug represents the speed the engine should achieve given the ambient conditions, thrust lever setting, flap setting, and squat switch position. N_1 is an indication of engine speed plus compensation. The FADEC takes into consideration its inputs to calculate and transmit the proper N_1 bug settings for the ambient conditions. While airborne with the flaps up, the N_1 bugs will show the proper N_1 for the selected throttle detent or, if the throttles are in between detents, the next higher setting. While on the ground, or inflight with flaps 3° or lower, the N_1 bugs will show takeoff power. On the ground with the thrust reversers deployed, the N_1 bugs will show the maximum reverse N_1 for the current conditions. Each engine FADEC has an externally mounted trim plug which provides trim compensation to the N_1 signal. This trim plug will ensure consistent N_1 indications for a specific paired throttle position. When ENG SYNC is On, compensation is removed. Each engine is also equipped with two induction-type speed sensors at the aft end of the low-pressure rotor. A toothed wheel is attached to the low-pressure shaft rotating adjacent to the stationary speed sensors. As the toothed wheel turns, its teeth cause the frequency output of the speed sensors to change proportionally.

The frequency of the output signal represents the speed of the rotating N1 group. One sensor provides output signals to the N1 indicator, and channel A of the FADEC while the other sensor provides output signals to channel B of the FADEC and the opposite engine's FADEC (used for APR and engine synchronizer). When electrical power is not available to the instrument, the pointer and N1 bug will go to the lowest possible position and the digital display will be blank. Upon initial power-up, the indicator will conduct a self test. During the self test, the digital display segments will illuminate and indicate "188.8". Failure of the self test is indicated by three dashes in the digital display and no pointer movement. Electrical power for the indicators is 28 VDC supplied through the 2-amp L and R N1 circuit breakers on the pilot's and copilot's circuit breaker panels respectively. In the event of a normal electrical system failure, the N1 indicators are powered by the emergency power system. Refer to Airplane Flight Manual for instrument limit markings.

N2 INDICATORS

An N2 indicator for each engine is installed on the center instrument panel. Each indicator utilizes both a four-place digital display and a circular scale with pointer to indicate N2. The circular scale is marked from 0% to 110% in 5% RPM increments. The digital display uses lighted segments to show the turbine speed to the nearest tenth of a percent. Each engine is equipped with two induction-type speed sensors installed on the right side of the accessory gearbox. The gearshaft teeth on the centrifugal impeller (within the accessory gearbox) rotate adjacent to the stationary speed sensors. As the gearshaft turns, its teeth cause the frequency output of the speed sensors to change proportionally. Since the accessory gearbox is driven by the N2 spool, the frequency of the output signal represents the speed of the rotating N2 group. One sensor provides output signals to the N2 indicator, and channel A of the FADEC while the other sensor provides output signals to channel B of the FADEC and the opposite engine's FADEC (used for APR and engine synchronizer). When electrical power is not available to the instrument, the pointer will go to the lowest possible position and the digital display will be blank. Upon initial power-up, the indicator will conduct a self test. During the self test, the digital display segments will illuminate and indicate "188.8". Failure of the self test is indicated by three dashes in the digital display and no pointer movement. Electrical power for the indicators is 28 VDC supplied through the 2-amp L and R N2 circuit breakers on the pilot's and copilot's circuit breaker panels respectively. Refer to Airplane Flight Manual for instrument limit markings.

ITT INDICATORS

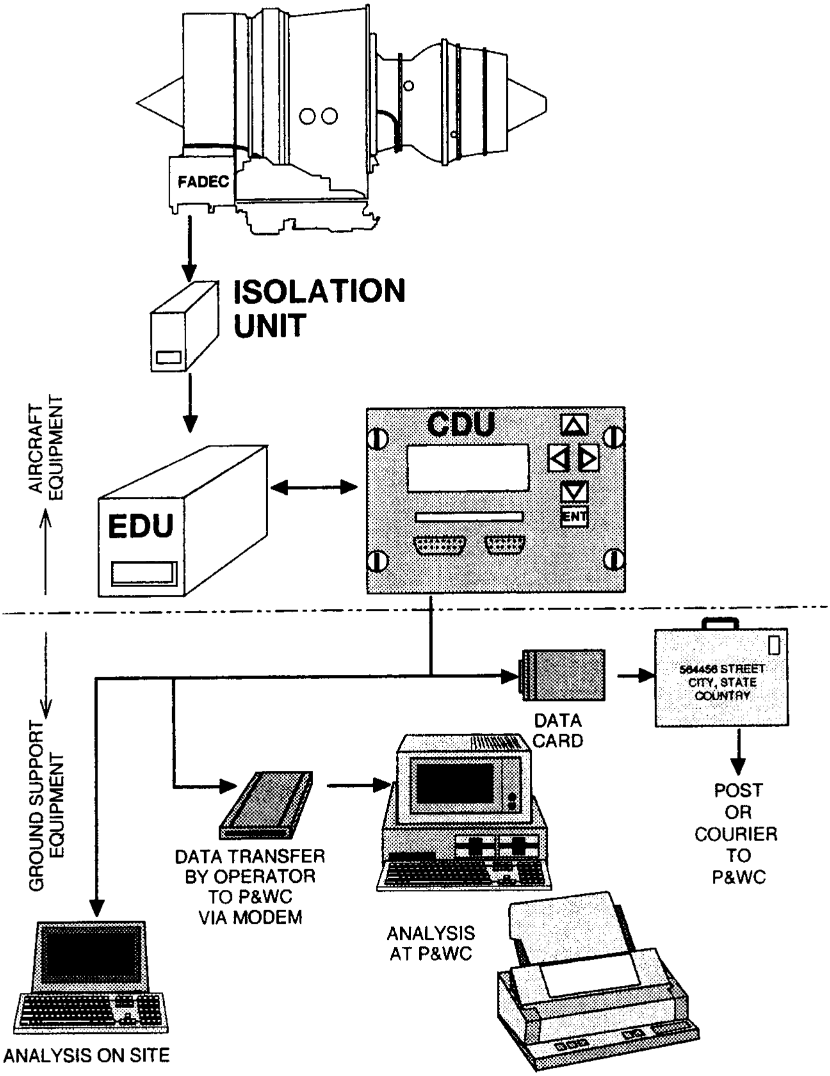
An ITT indicator for each engine is installed on the center instrument panel. Each indicator utilizes both a three-place digital display and a circular scale with pointer to indicate ITT. The scale is marked from 0°C to 1000°C in 50°C increments. The digital display uses lighted segments to show the turbine temperature to the nearest degree. Interstage turbine temperature for each engine is sensed by Chromel-Alumel parallel wired thermocouples positioned between the high- and low-pressure turbine sections at engine station 4.5. The thermocouples provide an average T4.5 signal to the FADEC. The ITT indicator is driven by a signal from the FADEC. When electrical power is not available to the instrument, the pointer will go to the lowest possible position and the digital display will be blank. Upon initial power-up, the indicator will conduct a self test. During the self test, the digital display segments will illuminate and indicate "888". Failure of the self test is indicated by three dashes in the digital display and no pointer movement. Electrical power for the indicators is 28 VDC supplied through the 2-amp L and R ITT circuit breakers on the pilot's and copilot's circuit breaker panels respectively. The ITT indicators are operative during EMER BUS mode. Refer to Airplane Flight Manual for instrument limit markings.

ENGINE DIAGNOSTIC SYSTEM

An Engine Diagnostic System (EDS) is installed to provide engine fault recording and trend monitoring. The system periodically records engine parameters and allows the crew to request that conditions be recorded at anytime. Normal use of the system entails downloading data from the EDS and submitting to Pratt and Whitney Canada for analysis on a monthly basis. The data may be downloaded at any time to assist in diagnosing engine problems which may be encountered. The EDS is intended for maintenance functions only and not for in-flight monitoring or diagnosis by the flight crew. The system consists of an Engine Diagnostic Unit (EDU), two isolation units (one for each engine), a Control Display Unit (CDU), a white EDS FAULT annunciator and an EDS RECORD switch on the center switch panel. The system is powered by 28 VDC through the 5-ampere ENGINE DIAGNOSTIC SYSTEM circuit breaker on the copilot's circuit breaker panel.

ENGINE DIAGNOSTIC UNIT

The Engine Diagnostic Unit (EDU) contains the memory used to store the collected data for each engine. The unit's capacity allows approximately 200 hours of data storage. The unit is installed in the tailcone. On the back of the EDU is a green, an amber, and a red light. The green light illuminates to indicate the EDS is powered. The red light illuminates to indicate the EDS has failed the self test.



ENGINE DIAGNOSTIC SYSTEM
Figure 2-3

ISOLATION UNITS

The isolation units are installed in the tailcone and provide protection for the FADECs in case of a fault in the engine diagnostic system.

CONTROL DISPLAY UNIT

The Control Display Unit (CDU) contains the display, control keys and connections necessary to control the system and download data. The CDU incorporates provisions to interface the system with a personal computer and provisions to download data onto a solid state data card. The unit is installed in the vertical web just forward of the entry door near the floor on the aircraft centerline. On some aircraft, the CDU may be installed in a storage well in the floor of the aft cabin baggage compartment and is accessed by raising the hinged lid.

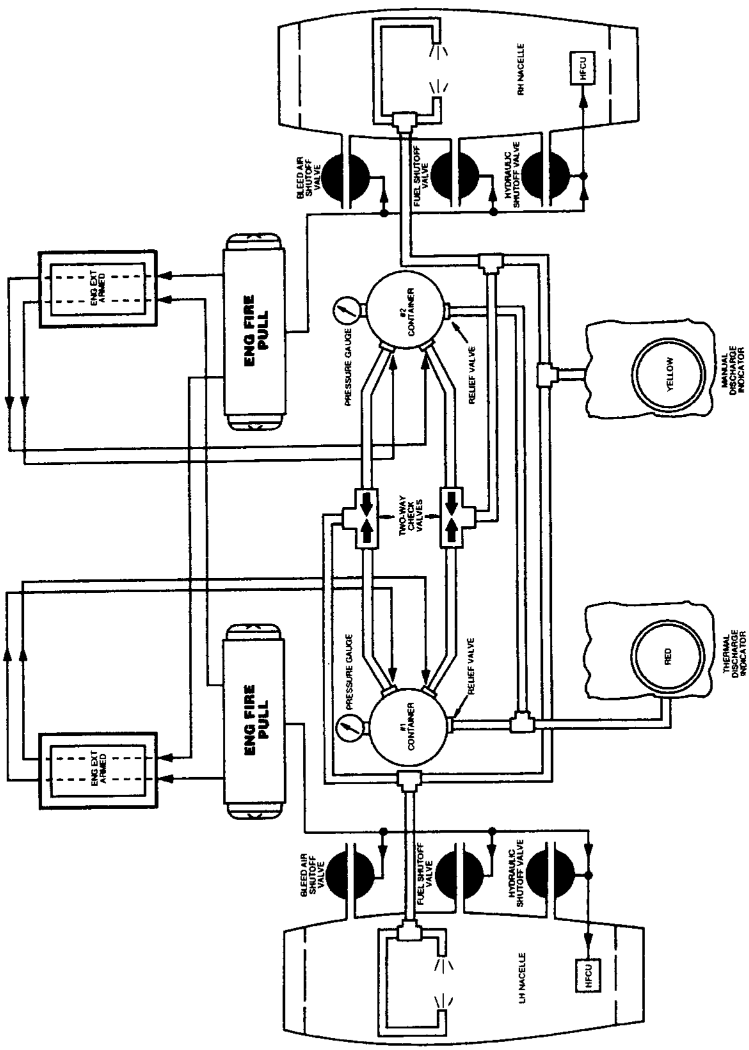
EDS FAULT ANNUNCIATOR

The white EDS FAULT annunciator is located in the glareshield annunciator panel. Illumination of the light indicates one of the following:

- The EDS is off.
- The EDU Built In Test Equipment (BITE) has detected a system failure.
- The EDU memory is 85% full.
- The system has detected an engine condition which is out of acceptable parameters.

EDS RECORD SWITCH

The EDS RECORD switch is located on the center switch panel. The purpose of the switch is to allow the flight crew to initiate data collection by the EDS. When the switch is actuated, the engine parameters existing four minutes prior to and one minute after switch actuation will be recorded in the EDU memory.



20-29C

FIRE EXTINGUISHING SYSTEM
Figure 2-4

ENGINE FIRE DETECTION SYSTEM

Three heat-sensing elements connected in series are located in each engine nacelle to detect an engine fire. One element is located around the accessory gearbox; one is located around the engine tailcone; and another around the engine firewall. On some aircraft, the fire detection system is controlled by two fire-detect control boxes located in the tailcone. On other aircraft, the fire detection system is controlled by a single fire-detect control box located in the tailcone. In the event of an engine fire, the control box(es) will sense a resistance change in the sensing elements and flash the applicable ENG FIRE PULL light. Electrical power for the system is 28 VDC supplied through the 7.5-amp L and R FIRE DETECT circuit breakers on the pilot's and copilot's circuit breaker panels respectively. The fire detect system is operative during EMER BUS mode.

SYSTEM TEST SWITCH — FIRE DETECTION FUNCTION

The rotary-type SYSTEM TEST switch on the instrument panel is used to test the fire detection system. Rotating the switch to FIRE DET and depressing the switch TEST button will connect a resistance into both fire detect system circuits. This resistance, simulating an engine fire, will cause both ENG FIRE PULL lights to illuminate and flash. It also tests and lights the ENG EXT ARMED lights. This test function also tests the tailcone bleed air overheat system. Depressing the TEST button will cause both red BLEED AIR L and BLEED AIR R lights to illuminate. These tests check the heat-sensing elements for continuity.

ENG FIRE PULL LIGHT

A red ENG FIRE PULL warning light is installed on the glareshield to warn the crew of a fire in the associated engine nacelle. In the event of an engine fire, the associated ENG FIRE PULL light will illuminate and flash. The light is part of a T-handle. Operation of the T-handle is explained under ENGINE FIRE EXTINGUISHING SYSTEM.

ENGINE FIRE EXTINGUISHING SYSTEM

The engine fire extinguishing system components include: two spherical extinguishing agent containers, an ENG FIRE PULL T-handle for each engine, two amber ENG EXT ARMED light/switches, a hydraulic shutoff valve for each engine, a fuel shutoff valve for each engine, a thermal discharge indicator, a manual discharge indicator, and associated wiring and plumbing. The system also utilizes the pneumatic system bleed-air shutoff valves. The system is plumbed to provide the

contents of either or both extinguishing agent containers to either engine nacelle. Two-way check valves are installed to prevent extinguishing agent flow between containers. The extinguishing agent, Halon 1301 (bromotrifluoromethane [CF_3Br]), is stored under pressure in the extinguisher containers and a pressure gage on each container is visible from inside the tailcone. Halon 1301 is non-toxic at normal temperatures and is non-corrosive. As Halon 1301 is non-corrosive, no special cleaning of the engine or nacelle area is required in the event the system has been used. The system operates on 28 VDC supplied through the 7.5-amp L and R FIRE EXT circuit breakers on the pilot's and copilot's circuit breaker panels respectively. The fire extinguishing system is operative during EMER BUS mode.

ENG FIRE PULL HANDLE AND ENG EXT ARMED LIGHTS

The engine fire extinguishing system is operated through the ENG FIRE PULL T-handles and the ENG EXT ARMED lights located on either end of the glareshield annunciator panel. The ENG EXT ARMED lights are combination light/switches. When the ENG FIRE PULL T-handle is pulled, the associated engine fuel, hydraulic, and bleed-air shutoff valves will close to isolate the affected engine. *On aircraft 60-097 and subsequent & prior aircraft modified by SB 60-78-5 (Installation of Thrust Reverser Hydraulic Control Relay Box),* the associated thrust reverser isolation valve will also close, shutting off hydraulic fluid to the associated thrust reverser. A solenoid valve in the HFCU shuts off fuel to the engine causing immediate shutdown, and both ENG EXT ARMED lights will illuminate. Illumination of the ENG EXT ARMED lights indicates that the fire extinguishing system is armed. Depressing an illuminated ENG EXT ARMED light will discharge the contents of an extinguisher bottle into the affected engine nacelle. Depressing the second ENG EXT ARMED light will discharge the contents of the other extinguisher bottle into the affected nacelle.

FIRE EXTINGUISHER DISCHARGE INDICATORS

Two disk-type indicators are flush-mounted in the fuselage under the left engine pylon. If the contents of either or both containers have been discharged into the engine nacelles, the yellow disk will be ruptured. If the contents of either or both containers have been discharged overboard as the result of an overheat condition causing excessive pressure within the containers, the red disk will be ruptured. If both disks are intact, the system has not been discharged. The indicators are readily accessible for visual inspection and must be checked for condition prior to each flight.

THRUST REVERSER SYSTEM

Each engine is equipped with an independent, electrically controlled, hydraulically actuated, target-type thrust reverser. The thrust reverser system consists of a thrust reverser assembly installation on each engine, thrust reverser levers on the main thrust levers, a throttle balk solenoid, associated hydraulic plumbing and associated electrical wiring. Each thrust reverser assembly installation consists of an upper and lower target-type door, four-bar door linkage, an inboard and outboard door actuator, two secondary latches, four stow switches and one deploy switch. A hydraulic control unit (HCU) for each thrust reverser is installed in the tailcone. The HCU controls the hydraulic flow to the associated thrust reverser in response to electrical inputs. Hydraulic power for thrust reverser operation is supplied by a combination of engine driven hydraulic pump flow and a thrust reverser accumulator. Pressure from the auxiliary hydraulic pump is not available to the thrust reverser system. The thrust reverser accumulator is plumbed primarily to power thrust reverser operations but assists the main system accumulator for landing gear, flap and brake operation. Refer to Section III for more details on the thrust reverser hydraulic system. Electrical power for thrust reverser control and auto stow functions is 28 VDC supplied through the 5-amp L and R TR CONT and the 5-amp L and R TR AUTO STOW circuit breakers on the pilot's and copilot's circuit breaker panels. The 7.5-amp WARN LTS circuit breakers supply electrical power for FADEC discrete signals and a redundant power source for the annunciator circuits.

DEPLOY

In order to arm a thrust reverser, both squat switches must be in the ground mode (aircraft weight on wheels), and the applicable thrust lever must be in the IDLE detent. When the prerequisite conditions are met, a signal from the applicable thrust reverser relay box will open the applicable isolation valve (within the HCU) allowing hydraulic pressure to be available for thrust reverser deployment. The presence of hydraulic pressure will actuate a pressure switch in turn illuminating the green TR ARM light. Lifting the thrust reverser lever to the DEPLOY detent will signal the applicable HCU to apply hydraulic pressure to the secondary latch actuators and deploy port of the thrust reverser actuators (inboard and outboard). When the secondary latches are released, the secondary latch stow switches send a signal to illuminate the amber TR UNLOCK light. Once the thrust reverser doors move out of the stowed position, the primary latch stow switches send a discrete signal to the on-side FADEC to limit engine thrust to idle. When the doors reach the fully deployed position, the deploy switch sends a signal to extinguish the amber TR UNLOCK light, illuminate the white

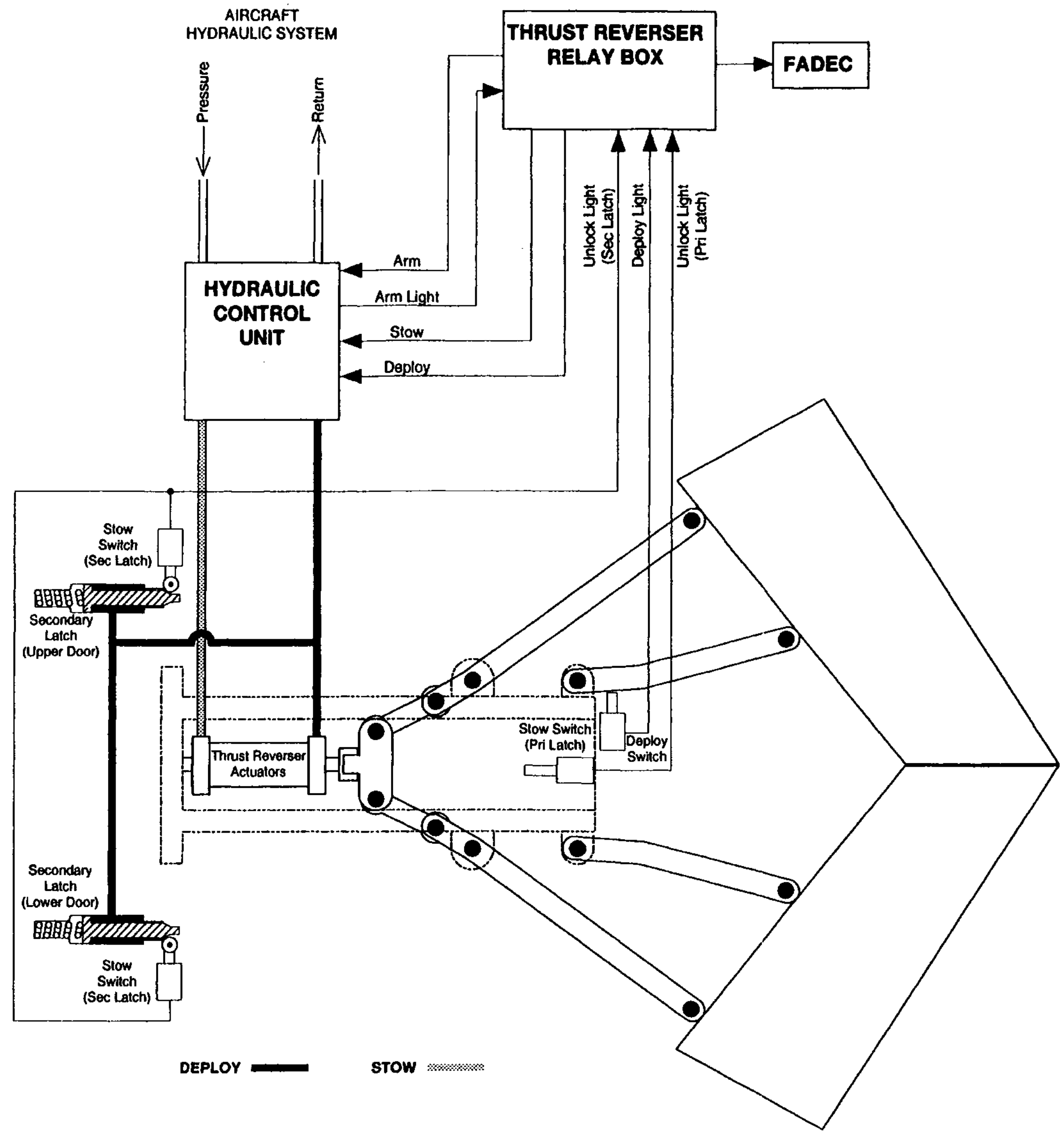
TR DEPLOY light and a discrete signal is sent to the on-side FADEC to allow engine thrust to increase above idle. The N1 bug will reposition indicating the FADEC is utilizing the reverse thrust schedule. A throttle balk solenoid prevents either thrust reverser lever from moving significantly above reverse idle until both thrust reversers are fully deployed. Once the deploy switches on both thrust reversers are actuated, the solenoid is energized allowing the thrust reverser levers to move into the reverse thrust range.

STOW

To stow the thrust reverser, the thrust reverser lever is moved into the STOW position. The thrust reverser relay box will signal the applicable HCU to apply hydraulic pressure to the stow port of the thrust reverser actuators (inboard and outboard). Once the thrust reverser doors move out of the deployed position, the deploy switch sends a signal to extinguish the white TR DEPLOY light, illuminate the amber TR UNLOCK light and a discrete signal is sent to the on-side FADEC to limit engine thrust to idle. When the doors reach the stowed position, the primary latch stow switches send a discrete signal to the on-side FADEC to restore engine thrust. The upper and lower doors trip their respective spring-loaded secondary latches as they reach the stowed and locked position. At this point, the secondary latch stow switches send a signal to extinguish the TR UNLOCK light.

AUTO STOW

The thrust reverser doors are mechanically secured in the stowed position by a four-bar overcenter door linkage (primary latch). Should an uncommanded unlock condition be sensed by the primary latch stow switches, an auto stow sequence will be initiated. The thrust reverser relay box will command the HCU to open the isolation valve and apply hydraulic pressure to the stow port of the thrust reverser actuators (inboard and outboard). A primary latch unlock condition will result in a discrete signal being sent to the on-side FADEC to limit thrust to flight idle, regardless of throttle position, until the thrust reverser is returned to the stowed position. An unlock condition sensed by the secondary latch stow switches will illuminate the TR UNLOCK light but will not initiate the auto stow sequence.



THRUST REVERSER SYSTEM SCHEMATIC
Figure 2-5

THRUST REVERSER ASSEMBLY

Each engine is equipped with a thrust reverser assembly attached to the engine outer fan duct. When stowed, the thrust reverser fairs with the nacelle and forms the engine afterbody. Each upper and lower door is attached to the support structure by a four-bar linkage. Two links are idler links and two are driver links. The driver links connect to the inboard and outboard actuators with an overcenter link. After stowing the doors, the actuators continue to drive the overcenter links to an overcenter position. This provides a mechanical latch to keep the doors stowed. This overcenter mechanism is referred to as the primary latch.

In addition to the primary latch, each thrust reverser door is held in the stowed position by a secondary latch. A latch plate on each door engages the spring-loaded secondary latch mechanism securing the door in the stowed and locked position. During the deployment sequence, each secondary latch is released by hydraulic pressure from the deploy line.

Each assembly is equipped with two primary latch stow switches, two secondary latch stow switches, and one deploy switch. The primary latch stow switches are used to detect the extreme aft (locked) position of the inboard and outboard actuators. The secondary latch stow switches are used to detect the engagement of the secondary latch with the thrust reverser doors. The deploy switch is actuated by one of the idler links and detects the fully deployed position. These switches provide signals to sequence the thrust reverser operation, control the thrust reverser annunciators, control the throttle balk solenoid and initiate the auto stow sequence.

THRUST REVERSER LEVER

A thrust reverser lever is mounted piggy-back fashion on each main thrust lever. The thrust reverser lever cannot be moved out of the STOW position unless the associated main thrust lever is at the IDLE stop. Similarly, the main thrust lever cannot be moved from the IDLE position when the associated thrust reverser lever is in the DEPLOY and reverse thrust range.

Moving the main thrust lever to IDLE actuates a switch in the throttle quadrant to signal the system to arm if the aircraft is on the ground.

Another switch in the throttle quadrant is actuated by the thrust reverser lever and signals the system to stow or deploy the associated thrust reverser.

When both thrust reversers are fully deployed, the thrust reverser levers are allowed to move beyond the DEPLOY detent into the reverse

thrust range. Moving the thrust reverser lever above reverse idle allows the engine to spool up providing the desired amount of reverse thrust. The FADEC will schedule reverse thrust as a function of airspeed (provided by ADC 1 and 2), decreasing thrust as the airplane slows down. If airspeed data is not provided to the FADEC, the maximum reverse thrust available will be 65% N1.

THROTTLE BALK SOLENOID

A throttle balk solenoid is installed in the pedestal to mechanically prevent either thrust reverser lever from moving into the reverse range until both thrust reversers are fully deployed. When the solenoid is de-energized, a spring-loaded lockout mechanism allows the thrust reverser levers to move between the STOW and DEPLOY positions only. When energized, the solenoid will overcome the spring-loaded lockout mechanism allowing the thrust reverser levers to move beyond the DEPLOY position into the reverse thrust range.

HYDRAULIC CONTROL UNIT

The hydraulic control unit (HCU) functions as a shutoff valve to isolate the thrust reverser system from the aircraft's hydraulic system and also as a selector valve directing hydraulic fluid to stow and deploy the thrust reverser doors as commanded.

The HCU incorporates both a mechanical and an electrical isolation valve. The mechanical valve may be manually closed and secured with a locking pin thereby deactivating the thrust reversers. The electrical valve is closed until the conditions for arming are satisfied or the auto stow sequence is initiated. The electrical signals to operate the HCU come from the applicable thrust reverser relay box. *On aircraft 60-097 and subsequent & prior aircraft modified by SB 60-78-5 (Installation of Thrust Reverser Hydraulic Control Relay Box)*, when the left or right ENG FIRE PULL T-handle is pulled, the associated isolation valve will close, shutting off hydraulic fluid to the associated thrust reverser.

A pressure switch, in the HCU, senses hydraulic pressure availability to the selector valve. When pressure is present, the switch will turn on the applicable TR ARM light.

Each HCU incorporates a check valve in the hydraulic return port which allows free flow from the HCU to the aircraft's hydraulic return system but no flow in the reverse direction.

THRUST REVERSER RELAY BOX

Two thrust reverser relay boxes are installed in the tailcone. One box controls the left thrust reverser system and the other controls the right. Inputs to each relay box are provided from: left and right squat switches, arming switch (throttle quadrant), stow/deploy switch (throttle quadrant), stow switches (thrust reverser assembly), deploy switch (thrust reverser assembly), and pressure switch (HCU). From the input signals the relay box determines the appropriate output signals including: arm thrust reverser (open isolation valve in the HCU), deploy thrust reverser, stow thrust reverser, initiate auto stow, limit engine thrust to idle (discrete signal to FADEC), restore engine thrust to normal (discrete signal to FADEC), enable thrust reverser levers (throttle balk solenoid), annunciate thrust reverser conditions and indicate to the takeoff monitor whether the thrust reverser is locked or unlocked.

AIRCRAFT FUEL SYSTEM

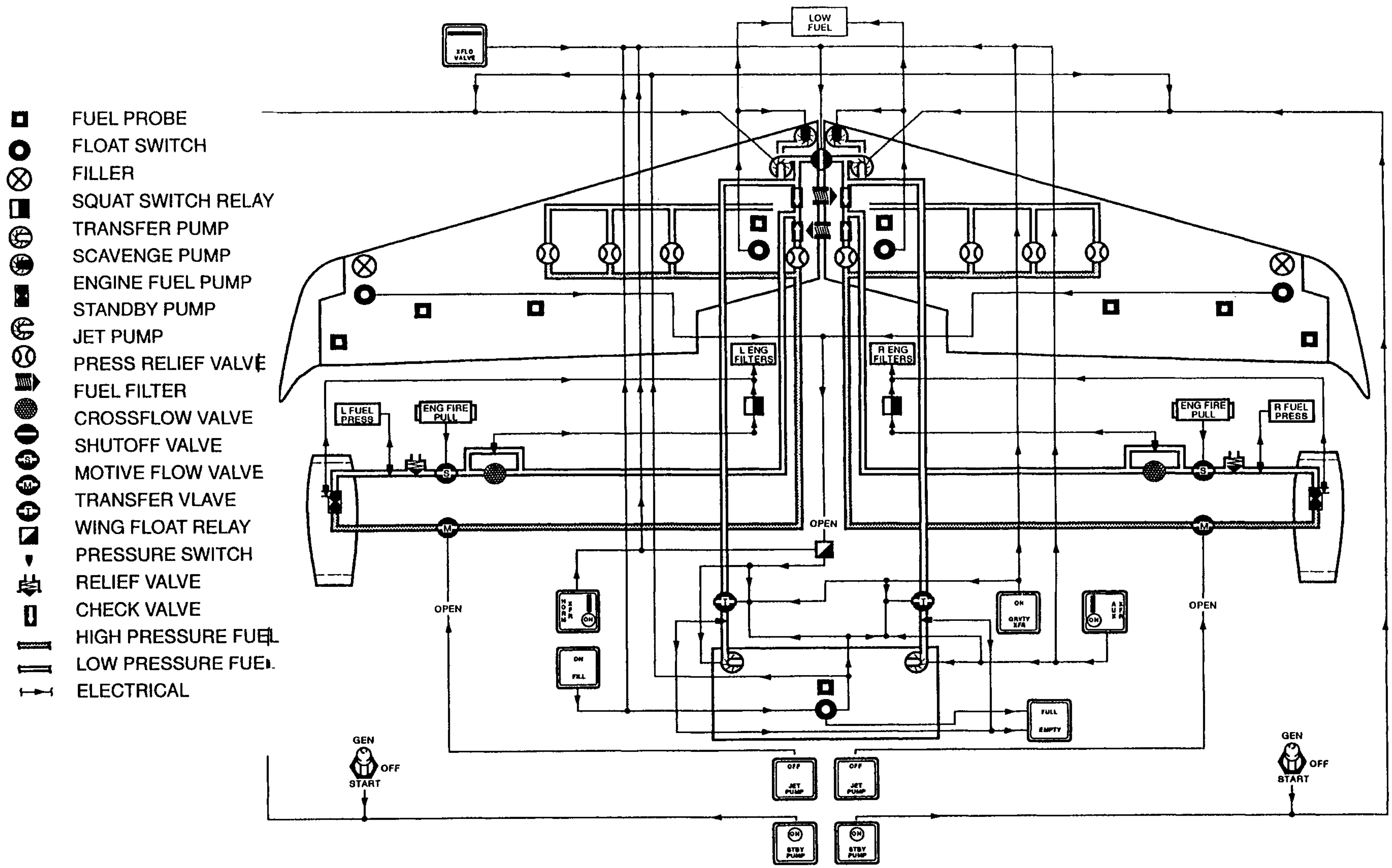
The aircraft fuel system consists of two wing tanks, a fuselage fuel tank, a fuel supply system, a fuel quantity indicating system, a fuel transfer system and a fuel vent system. Fuel fillers are located outboard near each wing tip. A single-point pressure refuel (SPPR) system is also installed.

WING TANKS

The wing is divided by a center bulkhead into two separate fuel-tight compartments which serve as fuel tanks. Each tank extends from the center bulkhead outboard to the wing tip rib, thus providing a separate fuel supply for each engine. A tank crossflow valve is installed to permit fuel transfer between wing tanks. Center bulkhead relief valves prevent wing tank overpressurization during fuel crossflow operations. Flapper-type check valves, located in the various wing ribs, allow free fuel flow inboard but restrict outboard fuel flow. A jet pump and an electric standby pump are mounted in each wing tank near the center bulkhead to supply fuel under pressure to the respective engine fuel system. An electric scavenge pump, located in the forward inboard section of each wing tank, is used to transfer fuel to the section containing the main fuel pumps and is operated by the low-fuel float switch. Three jet-type transfer pumps, located along the aft portion of each wing tank, transfer fuel to the section containing the main fuel pumps. A filler cap, located in the outer section of the wing tank, is used for fuel servicing.

FUSELAGE TANK

The fuselage tank, installed in the aft fuselage, consists of two interconnected bladder-type cells. The fuselage tank is provided with two transfer pumps, a float switch, a fuel quantity probe, and single-point pressure refuel provisions. The fuselage tank can be refueled by pumping wing fuel with the wing tank standby pumps through both transfer lines or by using the single-point pressure refuel system. Fuel can be transferred to the wing tanks by normal fuel transfer, auxiliary fuel transfer, rapid fuel transfer or gravity transfer. During the normal fuel transfer, the left fuselage tank transfer pump will pump fuel into both wing tanks. During the auxiliary fuel transfer, the right fuselage tank transfer pump will pump fuel into both wing tanks. During rapid fuel transfer, both the normal and auxiliary fuel transfer modes are energized. During gravity transfer, fuel will flow to both wing tanks through both transfer lines.



FUEL SYSTEM SCHEMATIC
Figure 2-6

FUEL CONTROL PANEL SWITCHES AND ANNUNCIATORS

The fuel control panel (Figure 2-7) incorporates all the necessary switches to fuel the aircraft (when using the over-the-wing method) and to maintain proper fuel management.

JET PUMP SWITCHES

The JET PUMP switches, on the fuel control panel, control the motive flow valves. The switches are an alternate action type. Selecting On, opens the corresponding motive flow valve and allows high-pressure fuel from the corresponding engine-driven fuel pump to flow to the corresponding jet pumps. Selecting OFF, closes the corresponding motive flow valve and renders the associated jet pumps inoperative. When OFF is selected, an OFF annunciation (on the switch) will illuminate and the Master CAUT lights will flash (Master CAUT will not illuminate during engine start). If a motive flow valve is neither open nor closed, the corresponding OFF annunciator will flash. The motive flow valves operate on 28 VDC supplied through the 5-amp L and R JET PUMP-XFR VALVE circuit breakers on the pilot's and copilot's circuit breaker panels. Loss of power to the motive flow valve causes the valve to remain in its last position. Motive flow valves are operative during EMER BUS mode.

STBY PUMP SWITCHES

The STBY PUMP switches, on the fuel control panel, control the operation of the standby electric pumps. The switches are an alternate action type. The switches normally remain Off except in the event of a jet pump failure or during fuel crossflow. Regardless of switch position, the standby pumps are automatically de-energized during fuselage fuel transfer operations. The standby pumps are automatically energized when the fuselage tank FILL function is selected or the START-GEN switch is set to START. An ON annunciation (on the switch) will illuminate whenever power is applied to the corresponding standby pump. The green FUEL SYS light, on the glareshield annunciator panel, will also illuminate whenever a standby pump is on. The standby pumps operate on 28 VDC supplied through the 15-amp L and R STBY-SCAV PUMP circuit breakers on the pilot's and copilot's circuit breaker panels.

XFLO VALVE SWITCH

The XFLO VALVE switch, on the fuel control panel, controls the crossflow valve. The switch is an alternate action type. Selecting

Open, opens the crossflow valve allowing fuel to flow between the wing tanks. Whenever the crossflow valve is open, a horizontal bar (on the switch) will illuminate to annunciate the valve's open status. The green FUEL SYS light will also illuminate whenever the crossflow valve is fully opened. If the crossflow valve is neither open nor closed, the horizontal bar will flash. The crossflow valve is opened automatically when filling the fuselage tank from the wings and during fuselage fuel transfer operations. To balance wing fuel, the XFLO VALVE switch should be set to Open and the heavy side STBY PUMP switch set to ON. The standby pump on the light side should be OFF. The standby pump will continue to operate until the STBY PUMP switch is set to Off. The crossflow valve allows all usable wing fuel aboard the aircraft to be available to either engine. The switch should be set to Off except when correcting an out-of-balance condition. The crossflow valve operates on 28 VDC supplied through the 5-amp XFLO VALVE circuit breaker on the pilot's circuit breaker panel. Loss of power to the crossflow valve causes the valve to remain in its last position. The crossflow valve is operative during EMER BUS mode.

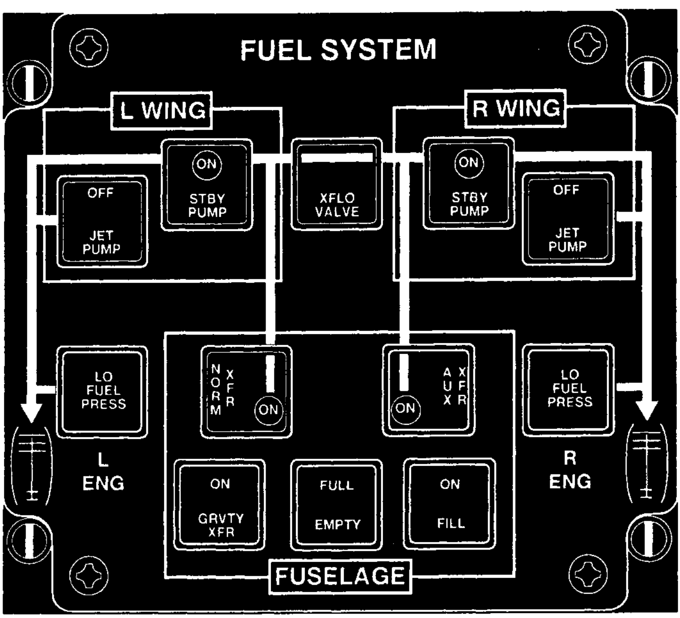
NORM XFR SWITCH

The NORM XFR switch, on the fuel control panel, is used to operate the normal (left) fuel transfer system. The switch is an alternate action type. When NORM XFR is selected, the left transfer pump is energized, the left transfer valve will open, both standby pumps will be rendered inoperative, and the crossflow valve will open. Fuel will then be pumped from the fuselage tank to the wing tanks until the wing float switches actuate to de-energize the transfer pump and close the transfer valve (the crossflow valve will remain open). If the fuselage tank should empty before the wing float switches shut down the left transfer system, a pressure switch in the fuselage tank transfer line will illuminate the EMPTY light. The green FUEL SYS light will illuminate when NORM XFR is selected and flash whenever the EMPTY light illuminates. Setting the switch to Off will extinguish the EMPTY light (if illuminated), close the left transfer valve, de-energize the left transfer pump, enable the standby pumps, and close the crossflow valve. Whenever the left transfer valve is open, a vertical bar (on the switch) will illuminate to annunciate the valve's open status. If the transfer valve is neither open nor closed, the vertical bar will flash. An ON annunciation (on the switch) will illuminate whenever power is applied to the left transfer pump. The left fuel transfer valve operates on 28 VDC supplied through the 5-amp L JET PUMP-XFR VALVE circuit breaker on the pilot's circuit breaker panel. Loss of

power to the left transfer valve causes the valve to remain in its last position. The left transfer pump operates on 28 VDC supplied through the 10-amp FUS TANK XFR PUMP circuit breaker on the pilot's circuit breaker panel. Both the valve and pump are operative during EMER BUS mode.

AUX XFR SWITCH

The AUX XFR switch, on the fuel control panel, operates the auxiliary (right) fuel transfer system which provides an alternate transfer system in the event the normal system fails or, when used in conjunction with the normal system, allows rapid transfer of fuselage fuel if desired. The switch is an alternate action type. When AUX XFR is selected, the right fuselage transfer pump is energized, the right transfer valve will open, both standby pumps will be rendered inoperative, and the crossflow valve will open. Fuel will then be pumped from the fuselage tank into the wing tanks. The switch should be set to Off when either the EMPTY light illuminates or the wing tanks become



FUEL CONTROL PANEL
Figure 2-7

full. The green FUEL SYS light will illuminate when AUX XFR is selected and flash whenever the EMPTY light illuminates. Setting the switch to Off will close the right transfer valve, de-energize the right transfer pump, close the crossflow valve, enable the standby pumps, and extinguish the EMPTY light, if illuminated. Actuation of the wing float switches has no effect on the auxiliary (right) fuel transfer system. Therefore, if the switch is not set to OFF when the wing tanks are full, fuel will continue to circulate between the fuselage and wing tanks through the wing expansion and fuel transfer lines. When the fuselage tank is emptied, a pressure switch in the right transfer line will actuate to illuminate the EMPTY light. Whenever the right transfer valve is open, a vertical bar (on the switch) will illuminate to annunciate the valve's open status. If the transfer valve is neither open nor closed, the vertical bar will flash. An ON annunciation (on the switch) will illuminate whenever power is applied to the right transfer pump. The right fuel transfer valve operates on 28 VDC supplied through the 5-amp R JET PUMP-XFR VALVE circuit breaker on the copilot's circuit breaker panel. Loss of power to the right transfer valve causes the valve to remain in its last position. The right transfer pump operates on 28 VDC supplied through the 10-amp FUS TANK AUX PUMP circuit breaker on the copilot's circuit breaker panel. Both the valve and pump are operative during EMER BUS mode.

GRVTY XFR SWITCH

The GRVTY XFR switch, on the fuel control panel, can be used to transfer fuselage fuel without using the transfer pumps. The switch is an alternate action type. When GRVTY XFR is selected, both transfer valves will open, the crossflow valve will open, and both standby pumps will be rendered inoperative. Fuel will then gravity flow from the fuselage tank to the wing tanks until the wings are full or the wing and fuselage tank heads are equal. When using this method to transfer fuel, approximately 350 pounds (159 kilograms) of fuel will remain in the fuselage tank and the EMPTY light will be inoperative. To assure all possible fuel has been transferred, reference must be made to the fuel quantity indicator. The switch should be set to Off when all fuel possible has been transferred and during approach and landing. The green FUEL SYS light and an ON annunciation (on the switch) will illuminate whenever gravity transfer is selected. Gravity transfer is operative during EMER BUS mode.

FILL SWITCH

The FILL switch, on the fuel control panel, is used to operate the fuselage tank fill system. The switch is an alternate action type and must be held approximately 3 seconds to select the FILL function. When FILL is selected, both wing tank standby pumps are energized, both left and right transfer valves are opened via the fuselage tank float switch, and the crossflow valve will open. Fuel will then be pumped into the fuselage tank from the wing tanks until the switch is turned Off or the fuselage tank float switch actuates to close the transfer valves, shut down the standby pumps, and illuminate the FULL light. Placing the switch in the Off position will extinguish the FULL light and close the crossflow valve. The green FUEL SYS light and an ON annunciation (on the switch) will illuminate whenever fuselage tank fill is selected. If FILL is selected and the left wing float switch trips the LOW FUEL light or the squat switch goes to the air mode, the fuselage tank fill function will be automatically deselected. The FILL function may be subsequently reselected, if desired.

FUSELAGE TANK SWITCH PRIORITY

The FUSELAGE Tank switches are listed below in their order of priority (highest to lowest). If the FUSELAGE Tank switches are positioned to contradictory positions, the function with the highest priority will override conflicting functions.

1. NORM XFR and AUX XFR switches (both have the same priority)
2. FILL switch
3. GRVTY XFR switch

FUSELAGE TANK FULL LIGHT

The FUSELAGE FULL light, on the fuel control panel, is installed to indicate a fuselage tank full condition during fuselage tank fill operations. The light is illuminated through actuation of the fuselage tank float switch. During normal fuselage tank fill operations, actuation of the float switch will illuminate the FULL light, close the transfer valves, and shut down the standby pumps. The FILL switch must be set to Off to extinguish the light.

FUSELAGE TANK EMPTY LIGHT

The FUSELAGE EMPTY light, on the fuel control panel, is installed to indicate a fuselage tank empty condition during fuel transfer. The light is operated by pressure switches in the left and right fuselage fuel transfer lines. As the fuselage tank empties during transfer operations, the pressure switches sense a loss of pressure in the transfer line and complete circuits to illuminate the EMPTY light. Either pressure switch can illuminate the light. Setting the NORM XFR and/or AUX XFR switch (as applicable) to Off will extinguish the light.

LO FUEL PRESS LIGHTS

The two LO FUEL PRESS lights, on the fuel control panel, repeat the L and R FUEL PRESS annunciators on the glareshield panel. See FUEL SYSTEM GLARESHIELD LIGHTS, this section.

FUEL GAGING SYSTEM

The fuel gaging system consist of a fuel quantity indicator installed in the cockpit, fuel quantity probes located in the various fuel tanks, and an optional total quantity indicator located near the single point pressure refueling controls. The fuel gaging system operates on 28 VDC supplied through the 2-amp FUEL QTY PWR 1 and FUEL QTY PWR 2 circuit breakers on the pilot's and copilot's circuit breaker panels. The fuel gaging system is operative during EMER BUS mode.

FUEL QUANTITY INDICATOR

The fuel quantity indicator, on the instrument panel, indicates fuel quantity in pounds (or optionally kilograms) of fuel. The indicator has four digital readouts — one for the left wing tank, one for the right wing tank, one for the fuselage tank, and one which shows the total of the other three summed together. *On aircraft 60-159 and subsequent and prior aircraft modified by SB 60-28-10 (Installation of Improved Fuel Quantity Indicator)*, inputs from the attitude heading reference system are used to correct the fuel quantity indication for aircraft pitch attitude. The indicator incorporates a feature to alert the crew of a fuel imbalance between the left and right wing tanks. Should a fuel imbalance of 500 pounds, (200 pounds if flaps are 8° or lower) or more occur, the fuel quantity reading representing the heavy wing and the IMB annunciator, on the fuel quantity indicator, will flash. The flashing annunciations may be cancelled by depressing and releasing the mute switch in the right thrust lever.

FUEL QUANTITY PROBES

Fuel quantity is sensed by four capacitance-type fuel quantity probes in each wing tank and a capacitance-type fuel quantity probe in the fuselage fuel tank. The left inboard fuel quantity probe incorporates a fuel temperature compensator which compensates for fuel density changes due to temperature.

TOTAL QUANTITY INDICATOR (SPPR)

The optional total quantity indicator, located with the single point pressure refueling controls, indicates total fuel quantity in pounds of fuel. The system may also be configured to indicate kilograms of fuel. The indicator has a digital readout which repeats the total indication shown on the cockpit indicator. Refueling personnel can use the indicator to determine the total fuel load without reference to the cockpit indicator.

FUEL SYSTEM GLARESHIELD LIGHTS

FUEL PRESS LIGHTS

The red L FUEL PRESS and R FUEL PRESS warning lights in the glareshield annunciator panel are installed to alert the pilot of a low fuel pressure condition. The FUEL PRESS lights are energized by a pressure switch installed in each engine fuel supply line between the aircraft fuel filter and the engine-driven fuel pump. When fuel supply pressure drops to 2.75 psi or below, the pressure switch closes to illuminate the respective light. At 3.75 psi, the switch will reopen. Should the light illuminate, the standby pumps should be used to supply engine fuel. The fuel control panel incorporates two LO FUEL PRESS lights which illuminate in conjunction with the associated glareshield warning light.

LOW FUEL LIGHT

The amber LOW FUEL caution light in the glareshield annunciator panel will illuminate when the fuel quantity in either wing tank decreases to approximately 410 pounds (186 kilograms) of fuel with the aircraft in a level attitude. The light is operated by a low wing fuel float switch installed in each wing tank. Either float switch may cause the light to illuminate.

FUEL SYS LIGHT

The green FUEL SYS light in the glareshield annunciator panel will illuminate whenever a fuel transfer function is selected on the fuel control panel.

The following conditions cause the light to illuminate:

- Crossflow valve is fully opened
- Either transfer valve (left or right) is open
- NORM, AUX, or GRVTY XFR is selected
- FILL is selected
- Either standby pump is on

The following conditions cause the light to flash:

- The fuselage EMPTY light is illuminated
- The fuselage FULL light is illuminated

RAM AIR FUEL VENT SYSTEM

The fuel vent system provides ram air pressure to all interconnected components of the fuel system to ensure positive pressure during all flight conditions. Flush mounted underwing scoops (inboard) admit pressure to the fuselage vent system, and a separate set of underwing scoops (outboard) admit pressure for the wing vent systems. The fuselage vent line is connected to a sump that has a moisture drain valve. Each wing tank vent system has a sump with a moisture drain valve located next to the wing vent underwing scoops. Overpressurization due to thermal expansion in the wing tanks is relieved through the left and right expansion lines to the fuselage tank. Overpressurization of the fuselage tank, should the vent and expansion lines be clogged, is relieved overboard through a pair of pressure relief valves and a separate vent line.

SINGLE-POINT PRESSURE REFUEL (SPPR) SYSTEM

The single-point pressure refueling (SPPR) system allows the entire fuel system to be serviced through a fuel servicing adapter located on the right side of the aircraft below the engine pylon. An SPPR control panel is located immediately forward of the refuel adapter. The SPPR incorporates a precheck system which allows the operator to check the operation of the system vent and shutoff valves before commencing refuel operations. The major system components are the refuel adapter, the control panel, a vent valve, a shutoff valve and pilot valve for each tank (both wings and fuselage), solenoid valve for the fuselage tank, two precheck valves, and associated plumbing and wiring. The control panel is located on the right fuselage below the engine pylon. Electrical power to operate the system indicator lights and solenoid valve is 28 VDC supplied from the #2 battery through the BATT ON-OFF switch on the refuel control panel.

The vent valve is installed to prevent system overpressurization in the event of a shutoff valve failure. Operation of the valve is checked during the precheck sequence. The valve automatically opens whenever fuel pressure is applied to the system. When the valve reaches the full open position, a switch in the valve completes a circuit to illuminate the VENT OPEN light on the SPPR control panel.

Each shutoff valve is controlled by the associated pilot valve located at the high point in each tank. When refueling pressure is applied to the system through the refuel adapter, pressurized fuel is applied to each shutoff valve. This pressure is applied to both sides of the valve poppet. If the pilot valve is open (associated tank not full), some of the pressure acting to hold the valve closed will be vented through the pilot valve and the pressure acting to unseat the poppet will drive the valve open against the spring tension. When the tank fills, the pilot valve will close, fuel pressure on both sides of the shutoff valve poppet will equalize, and spring tension will drive the valve closed.

The solenoid valve for the fuselage tank is located between the tank pilot valve and shutoff valve in the vent line. This valve is normally closed and must be energized open in order to open the shutoff valve for filling the tank. The valve is used to isolate the fuselage tank if filling that tank is not desired.

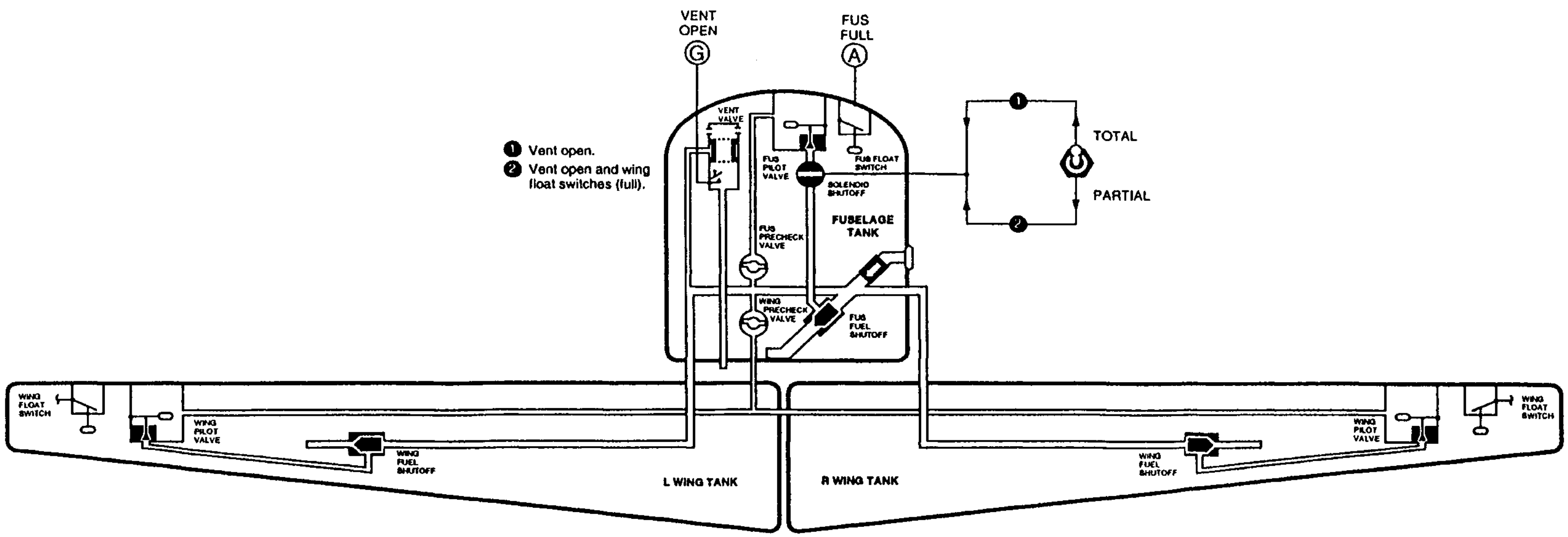
WING AND FUS PRECHECK VALVES

The WING and FUS PRECHECK valves are used to check operation of the system vent valve and individual shutoff valves before full refueling procedures are commenced. System precheck is accomplished with the Refuel Selector switch set to TOTAL in order to check all shutoff valves. When the WING and FUS PRECHECK valves are set to OPEN (grips vertical) and refuel pressure is applied to the refuel adapter, fuel will be admitted to the precheck lines and to the tank fill lines. The shutoff valves will open and fuel will flow into all tanks. The fuel in the precheck lines will empty into a float basin at each pilot valve. When the basin fills the pilot valve float will close the pilot valve, which causes the associated shutoff valve to close terminating fuel flow. The vent valve should open when fuel flow is initiated. Fuel flow should stop within 10 to 20 seconds.

REFUEL SELECTOR SWITCH

The Refuel Selector switch, on the SPPR fuel control panel, is used to select the tank(s) to be filled during refueling. The switch has two positions: TOTAL and PARTIAL.

The TOTAL position of the Refuel Selector switch is used to fill the wing and fuselage tanks simultaneously. When TOTAL is selected and refueling pressure is applied (vent valve opens), circuits are completed to open the fuselage tank solenoid valve. When the solenoid valve opens the fuselage tank shutoff valve will open to admit fuel into the fuselage tank.



SINGLE-POINT REFUEL SYSTEM SCHEMATIC
Figure 2-8

The PARTIAL position of the Refuel Selector switch is used to fill the wings first and then the fuselage. This is useful when full wings and less than full fuselage fuel is desired. When PARTIAL is selected and the vent valve opens, the fuselage tank solenoid valve will be controlled by the wing high-level float switches. When the wings are full, the wing high-level float switches complete the circuit to open the fuselage tank solenoid valve. When the solenoid valve opens, the fuselage tank shutoff valve will open and admit fuel to the fuselage tank.

SPPR BATT SWITCH

The BATT ON-OFF switch, on the refuel control panel, allows operation of the single-point pressure refuel system without the need to enter the cockpit in order to energize aircraft power. When the switch is set to ON, DC power from the aircraft's #2 battery is applied to the SPPR control circuits.

FUS FULL LIGHT

The amber FUS FULL light, on the refuel control panel, will illuminate whenever the fuselage tank float switch actuates. The light illuminates to alert the operator that refuel operations should have automatically terminated. If fuel flow continues with the light illuminated, fueling operations should be immediately terminated.

VENT OPEN LIGHT

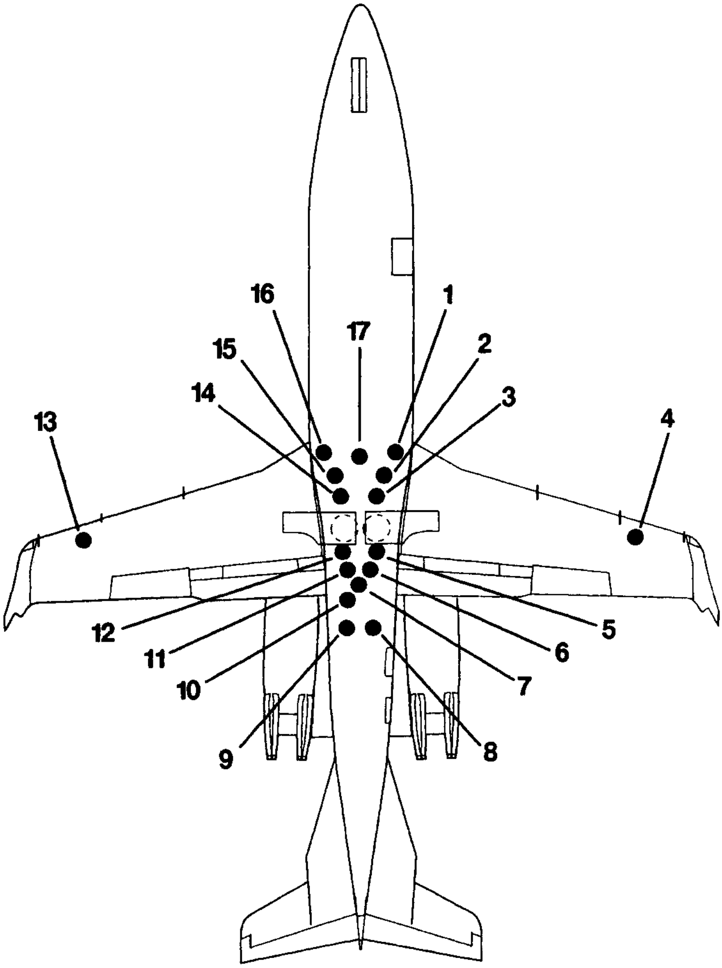
The green VENT OPEN light, on the refuel control panel, will illuminate whenever the fuselage tank vent valve opens. The light is operated by a microswitch in the valve. The circuit for the fuselage tank solenoid valve is wired through this switch to prevent filling the fuselage tank until the vent valve opens.

FUEL ANTI-ICING ADDITIVE

Anti-icing additive is not a requirement. However, for microbial protection, it is recommended that anti-icing additive be used at least once a week for aircraft in regular use and whenever a fueled aircraft will be out of service for a week or more. Refer to the Airplane Flight Manual for the recommended concentration and the proper method of blending anti-icing additive.

REFUELING

The aircraft may be refueled through filler caps on each wing tip or through the single-point pressure refuel adapter on the right fuselage below the engine pylon. Bonding jacks are located on the underside of each wing near the fuel filler and behind the SPPR control panel door. Refer to the Airplane Flight Manual for approved fuels and proper refueling procedures.



1. Left Wing Scavenge Pump
2. Left Wing Sump
3. Left Engine Fuel
4. Left Wing Vent (sump)
5. Left Wing Expansion Line
6. Left Wing Transfer Line
7. Fuel Vent (fuselage)
8. Left Fuel Filter
9. Right Fuel Filter
10. Fuselage Tank Sump
11. Right Wing Transfer Line
12. Right Wing Expansion Line
13. Right Wing Vent (sump)
14. Right Engine Fuel
15. Right Wing Sump
16. Right Wing Scavenge Pump
17. Fuel Crossover

FUEL DRAINS
Figure 2-9

AUXILIARY POWER UNIT (APU)

The optional Auxiliary Power Unit (APU), located in the rear equipment bay, is a self-contained, single stage gas turbine unit that can be operated continuously up to an ambient temperature of 130° F (54° C). The APU provides electric power for ground operations of the aircraft electrical system, independent of the aircraft main engines. It is restricted to ground operations only. The starting, acceleration and operation of the engine is controlled by an integral system of automatic and coordinated pneumatic and electromechanical controls.

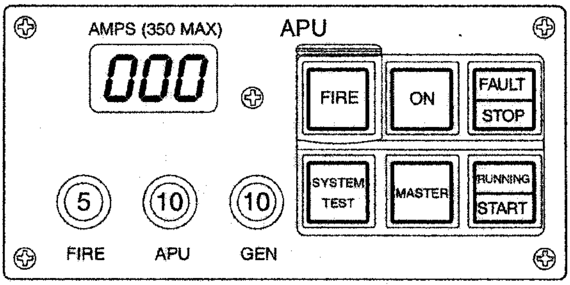
The APU engine is comprised of three major sections: the accessory section, compressor section and turbine section. Engine power for the auxiliary power unit is developed through compression of ambient air by a single entry, radial, outward-flow, centrifugal compressor. The compressed air, when mixed with fuel and ignited, drives a radial inward-flow turbine rotor.

The APU control panel (located above the copilot's circuit breaker panel) contains all the primary controls to operate the APU. There is also an APU Relay Panel and APU BITE (Built-In-Test-Equipment) box (primarily for maintenance use), located in the APU compartment, which displays the fault codes associated with the APU.

The engine is controlled and serviced by four systems: the engine fuel system, lubrication system, electrical system and indicating system. Fuel for the APU flows from the fuselage fuel tank on *aircraft 60-001 thru 60-072*, or the left wing fuel tank on *aircraft 60-073 and subsequent*, through the APU boost pump, a shutoff valve and a fuel filter prior to reaching the APU. The APU uses approximately 40 pounds of fuel per hour. Running out of fuel in the fuselage fuel tank or left wing fuel tank will introduce air in the APU fuel lines which will cavitate the APU and prevent it from restarting immediately. The APU gearbox serves as an oil sump for the APU self-contained lubrication system. The APU Electronic Sequence Unit (ESU) is a fully automatic system that directs delivery of the correct amount of fuel regardless of ambient conditions and load requirements, as well as properly sequencing control of fuel and ignition during starting. The ESU also monitors engine parameters during operation and automatically shuts down the APU in the event a parameter is not within operational limits. A weight-on-wheels input prevents operation of the APU while airborne.

APU CONTROL PANEL

The APU control panel, located above the copilot's circuit breaker panel, houses the necessary controls for operation and monitoring. APU fire detection/extinguishing controls are also located on the APU control panel.



APU CONTROL PANEL
Figure 2-10

APU AMPS INDICATOR

The AMPS indicator is a digital display indicating the amperage output of the APU generator (shows zero during start). Display will flash when current is at or above 400 amps.

APU FIRE

This switch/indicator is used to show an APU system fire or overheat (800°F at a single point in the fire loop or 375°F within overall length of the fire loop) and activate the APU fire extinguishing system. Should there be a fire/overheat in the APU, as detected by the fire loop, the FIRE switch/indicator will indicate FIRE (red), the aircraft Master WARN light will illuminate, and the APU fire warning horn will sound. The fire detection/extinguishing system will automatically shut down the APU by closing the fuel shutoff valve, and activate the fire extinguisher within 15 seconds.

Depressing the FIRE switch/indicator will also shut down the APU and discharge the APU fire extinguishing bottle.

APU FAULT/STOP SWITCH

This switch/indicator is a momentary, two cell, lighted switch. The lower portion is labeled STOP (white) and during normal operation this switch is used to shut down the APU by sending an overspeed signal to the Electronic Sequence Unit of the APU. A normal shutdown will not cause the FAULT half of the switch to illuminate. The top portion of this switch is labeled FAULT (amber) and shows a malfunction in the APU system. The APU will automatically shut down if a fault is sensed. The FAULT indicator circuit is latched and is cleared by the FAULT RESET switch on the APU relay box, located near the APU.

APU RUNNING/START SWITCH

This switch/indicator is a momentary, two cell, lighted switch. Depressing this switch initiates the APU start sequence. The lower portion is labeled START (white) and is illuminated whenever the MASTER Switch is on to identify the switch. The top portion is labeled RUNNING (green) and is illuminated when the APU is running and supplying or ready to supply power to the aircraft.

APU MASTER SWITCH

The APU MASTER switch is used to power up the APU control circuits from the aircraft normal electrical system. The legend is daylight readable and illuminated white when the aircraft NAV light switch is on.

APU ON INDICATOR

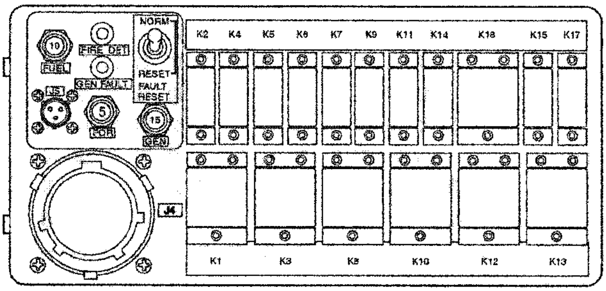
The APU ON (green) indicator illuminates when the MASTER switch is on.

APU SYSTEM TEST SWITCH

The APU SYSTEM TEST switch tests the integrity of the APU fire loop/ extinguishing system. Depressing this switch will also test all annunciator lights on the APU control panel, sound the APU fire horn, close the APU fuel shutoff valve and illuminate the aircraft Master WARN/ CAUT lights. Depressing this switch while the APU is running will close the APU fuel shutoff valve and shut down the APU.

APU RELAY PANEL

The APU relay panel is located in the rear equipment bay, next to the APU. The panel contains circuit breakers and relays which interface to the APU control panel and system components for starting and operating the APU. The relay panel also contains two magnetic latching BITE indicators to display generator faults or overheat faults.



APU RELAY PANEL
Figure 2-11

FIRE DET BITE INDICATOR

The white FIRE DET indicator shows a fire or overheat condition has been detected.

GEN FAULT BITE INDICATOR

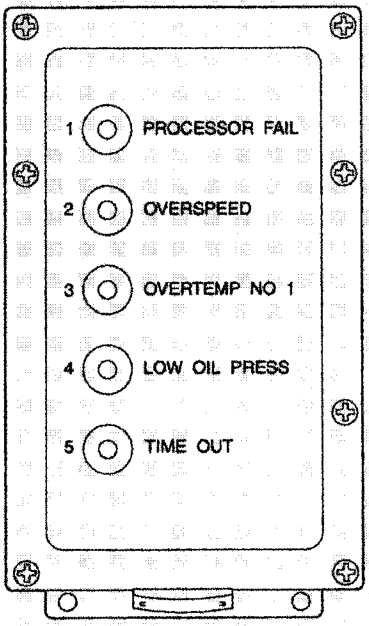
The white GEN FAULT indicator shows a generator fault has been detected by the ESU.

FAULT RESET SWITCH

This switch has two positions, NORM and RESET. The switch is spring loaded to remain in the NORM position for normal APU operations. Selecting the RESET position resets the FIRE DET and the GEN FAULT BITE indicators.

APU BITE ANNUNCIATOR BOX

The BITE annunciator box, located in the APU compartment, will display any fault codes (BITE indication) encountered. An indicator activated white shows a malfunction.



APU BITE ANNUNCIATOR BOX
Figure 2-12

APU GENERATOR

Refer to Section IV, ELECTRICAL & LIGHTING, for information on the APU generator.

APU OPERATING PROCEDURES

APU PRE-START CHECK

This check should be accomplished in addition to the Preflight Inspection in Section II of the FAA approved Airplane Flight Manual.

1. APU Oil Level — Check.
2. Check APU area for indications of oil or fuel leaks.
3. FUEL, GEN, & POR (Point of Regulation) Circuit Breakers (APU Relay Panel) — Set.
4. APU Inlet & Exhaust — Clear.
5. FIRE, APU, & GEN Circuit Breakers (APU Control Panel) — Set.
6. BATTERY 1 & BATTERY 2 Switches — On.
7. GPU (if desired) — Connect.
8. Verify 18 volts minimum are available for starting the APU.
9. *Aircraft 60-001 thru 60-072,* Fuselage Fuel Quantity — Check.
10. *Aircraft 60-073 and Subsequent,* Left Wing Fuel Quantity — Check.
11. APU MASTER Switch — Press. Verify ON, START, STOP and AMPS indicator all illuminate.
12. APU SYSTEM TEST Switch — Press. APU fire horn sounds, APU FIRE warning switch, all APU annunciator lights illuminate and the digital AMPS indicator displays all 8's.

APU START-UP

To start the APU:

1. BCN/STROBE Switch — BCN.
2. APU START Switch — Press (momentarily). An automatic start sequence is initiated and the following events will occur:
   - The APU engine start relay receives starting power from the aircraft batteries or external power.
   - At 5% RPM the APU fuel shutoff valve opens.
   - At 65% RPM the starter is de-energized.
   - At 98% RPM + 20 seconds the green RUNNING annunciator illuminates indicating the APU is ready to provide electrical power. If external ground power is not being used, the APU generator will automatically go on-line and the AMPS indicator will indicate the APU generator load.
3. GPU (if applicable) — Disconnect.

APU SHUTDOWN

To shut down the APU:

1. APU STOP Switch — Press (momentarily). An automatic shutdown sequence is initiated. Verify that the green RUNNING light goes off.
2. APU MASTER Switch — Press. The APU ON annunciator will extinguish.
3. BCN/STROBE Switch — Off.
4. BATTERY Switches — Off.

APU SHUTDOWN FEATURES (Automatic)

During APU operation, the ESU monitors engine speed, temperature, oil pressure and electrical surge conditions. The ESU contains circuitry which will automatically send a signal to the APU Relay Panel which in turn will close the fuel shutoff valve and shut down the APU under the following conditions:

- Overspeed
- Underspeed
- Over temperature
- Low oil pressure
- Loss of EGT signal to the APU ESU
- Loss of RPM
- High oil temperature
- APU fire indication
- Low fire bottle pressure
- Generator malfunction

SECTION III
HYDRAULICS & LANDING GEAR

TABLE OF CONTENTS

SECTION III
HYDRAULICS & LANDING GEAR

HYDRAULIC SYSTEM

The aircraft hydraulic system supplies hydraulic pressure for operation of the aircraft landing gear, brake, flap, spoiler and thrust reverser systems. Hydraulic fluid is supplied from the hydraulic reservoir through shutoff valves to the engine-driven hydraulic pumps for distribution to the required systems upon demand. The engine-driven, variable-volume hydraulic pumps will normally maintain system pressure between 1400 and 1550 psi. A pressure relief valve installed between the high-pressure and return lines will open to relieve pressure in excess of 1750 psi. Reservoir pressure is maintained at approximately 20 psi by bleed air supplied through a pressure regulator. Reservoir pressure in excess of 20 psi is relieved overboard by a pressure relief valve and a vacuum relief valve prevents negative pressure in the reservoir. Two precharged (850 psi) hydraulic accumulators are installed to dampen and absorb pressure surges. Both accumulator indicators are located under the right engine behind a transparent sight panel. The right-hand accumulator is plumbed for the brakes, landing gear and flaps; the left-hand accumulator is plumbed primarily to power thrust reverser operations but assists the main system accumulator for landing gear, flap and brake operation. Two high-pressure filters and one return filter prevent hydraulic fluid contamination. The return filter incorporates a bypass valve which will open in the event it becomes clogged. Both the high-pressure and return filter incorporate an overpressure bypass button. An auxiliary hydraulic pump is installed to provide system pressure in the event of a malfunction or during engine-off ground operations.

The thrust reverser hydraulic system incorporates a mechanically controlled isolation valve that will shut off hydraulic fluid to the thrust reverser system if it senses that hydraulic pressure in the main hydraulic system has dropped below approximately 150 psi. This prevents thrust reverser activation in the unlikely event of engine driven pump failure. A one-way check valve downstream of the thrust reverser system ensures that fluid does not back-up from the main system.

Two motor-driven firewall shutoff valves can stop hydraulic fluid flow to the engine-driven hydraulic pumps in the event of an emergency or engine fire. Each shutoff valve is operated by the corresponding ENG FIRE PULL T-handle on the glareshield. (Refer to EN-

GINE FIRE EXTINGUISHING). The valves operate on 28 VDC supplied through the 7.5 amp L and R FW SOV circuit breaker on the pilot's and copilot's circuit breaker panels respectively. Loss of power causes the shutoff valves to remain in their last position. The firewall shutoff valves are operative during EMER BUS mode.

The system is serviced through a ground service access located below the right engine pylon. The service access includes quick-disconnect ports for pressure and return lines, an air valve for accumulator charging, and a direct-reading accumulator pressure gage.

HYD PUMP SWITCH

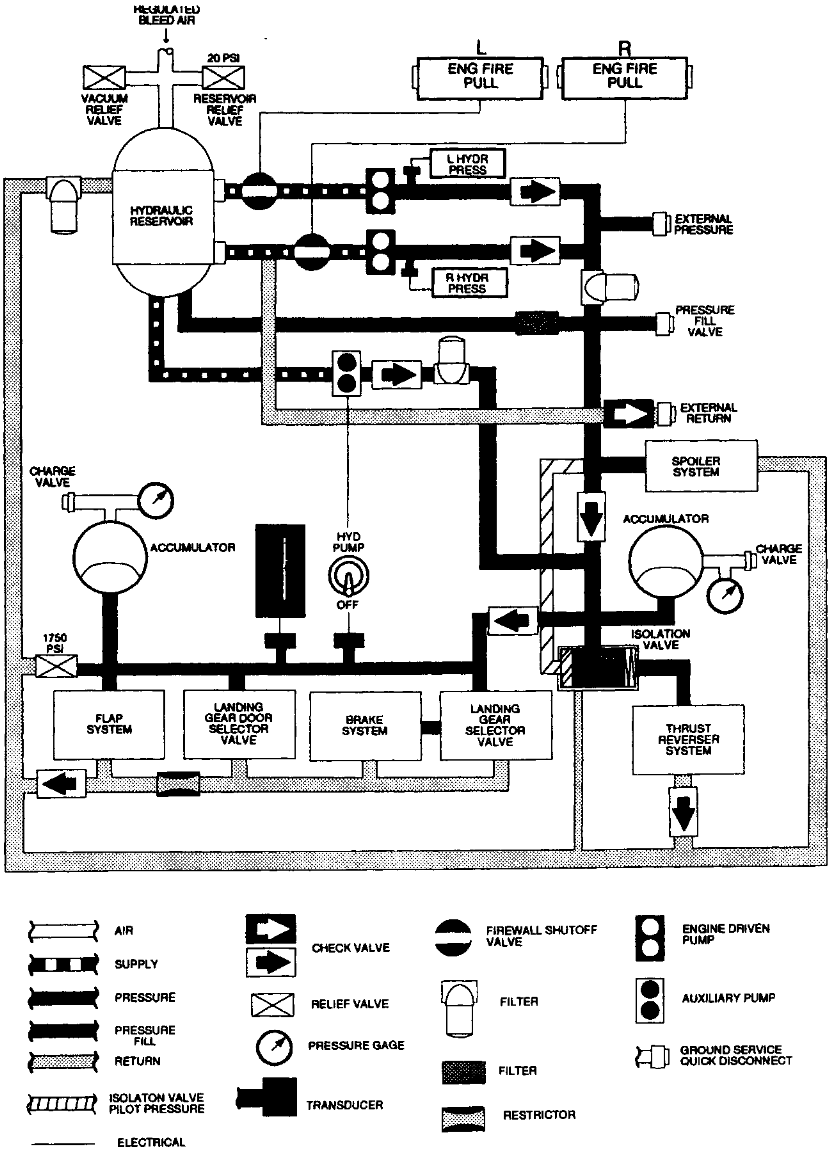
The auxiliary hydraulic pump is controlled by the HYD PUMP switch located on the center switch panel. When the switch is placed in the On (HYD PUMP) position, the auxiliary hydraulic pump is cycled by a pressure sensing switch plumbed into the high-pressure side of the system. The pressure switch will energize the auxiliary hydraulic pump if system pressure drops below approximately 1000 psi and then de-energize the pump when system pressure rises above approximately 1100 psi. The auxiliary hydraulic pump is plumbed to provide hydraulic pressure for the landing gear, wheel brake, and flap systems only and will not supply pressure for operation of the spoilers or thrust reversers. The auxiliary hydraulic pump operates on 28 VDC supplied through a 50-amp current limiter and is available when EMER BUS is selected. Refer to Airplane Flight Manual for hydraulic pump limitations.

HYDR PRESS LIGHTS

Illumination of the amber L and R HYDR PRESS lights on the glareshield annunciator panel indicate low hydraulic system pressure from either the left or right engine driven pump respectively. The lights are operated by the hydraulic pump pressure switches that sense hydraulic pressure provided by each engine-driven pump. The L or R HYDR PRESS light will illuminate when hydraulic system pressure drops below approximately 150 (±50) psi in the engine-driven hydraulic pump line.

HYD PRESS INDICATOR

The HYD PRESS indicator is a vertical-scale instrument and is located on the center switch panel adjacent to the auxiliary hydraulic pump and anti-skid switches. The indicator face consists of a vertical scale marked from 0 to 2000 psi in 500 psi increments and a pointer at the right margin of the instrument. The instrument is operated by a pressure transducer plumbed to the high-pressure side of the hydraulic system in the gear, flap and brake part of the circuit. The indicator operates on 28 VDC supplied through the 1-amp HYDRAULIC PRESS IND circuit breaker on the copilot's circuit breaker panel. Refer to Airplane Flight Manual for instrument limit markings.



HYDRAULIC SYSTEM SCHEMATIC
Figure 3-1

EMERGENCY AIR SYSTEM

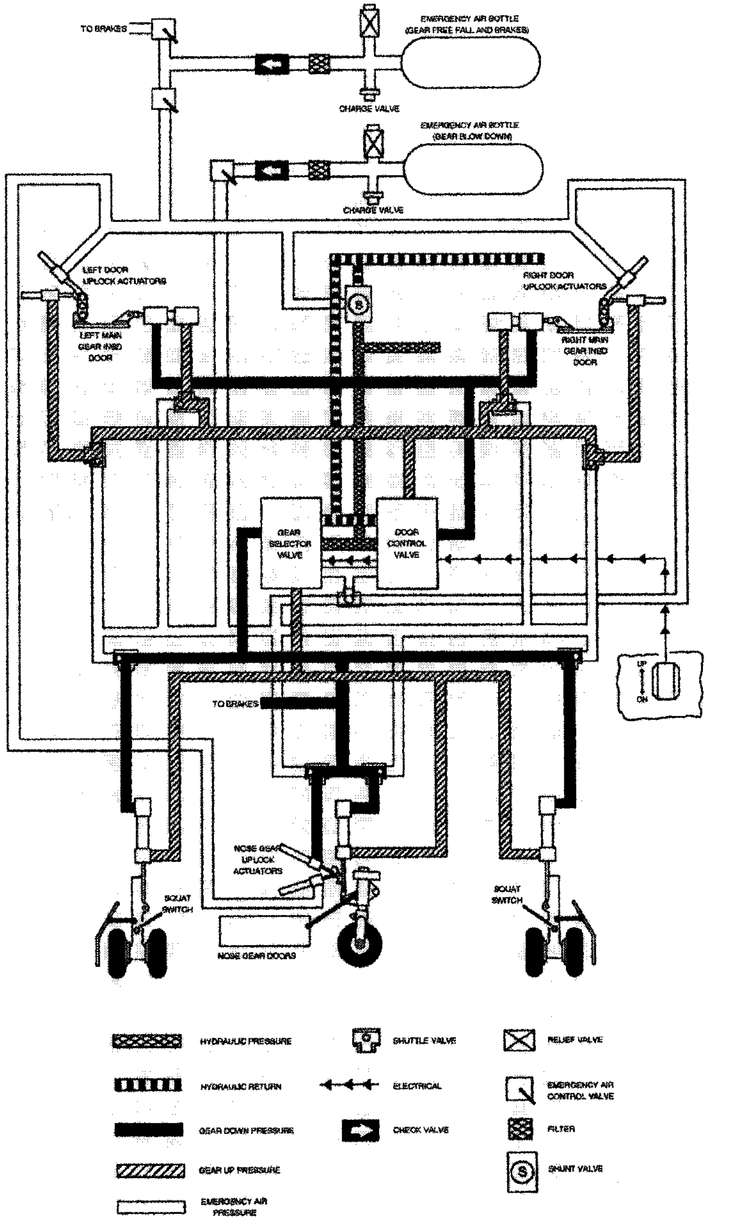
Two emergency air bottles (3000 psi) are installed to provide alternate gear extension and emergency braking in the event of an electrical or hydraulic system failure. One bottle provides air pressure to operate the emergency gear extension blow down system and the other bottle provides air pressure to operate the emergency brakes and emergency gear extension free fall systems. *On aircraft 60-001 thru 60-103,* the emergency air bottles are installed in the right nose compartment. *On aircraft 60-104 and subsequent,* one emergency air bottle is installed behind the left wing/fuselage fairing, and the other is installed behind the right wing/fuselage fairing. Refer to LANDING GEAR ALTERNATE EXTENSION and EMERGENCY BRAKES for system operation.

EMERGENCY AIR PRESSURE INDICATOR

The emergency air pressure indicator is a vertical scale, dual-reading instrument and is located on the center switch panel adjacent to the hydraulic pressure indicator. The indicator face consists of a center scale reading from 0 to 4000 psi in 500 psi increments and two pointers on opposite margins of the scale. The left margin is labeled GEAR AIR and the right margin is labeled BRAKE AIR. The indicator pointers are operated by transducers plumbed to the corresponding emergency air bottles. The GEAR AIR pointer indicates the state of charge for the air bottle operating the alternate gear extension blow down system and the BRAKE AIR pointer indicates the state of charge for the air bottle operating the emergency braking and alternate gear extension free fall systems. The indicator operates on 28 VDC supplied through the 1-amp AIR PRESS IND circuit breaker on the copilot's circuit breaker panel. Refer to Airplane Flight Manual for instrument limit markings.

LANDING GEAR SYSTEM

The landing gear is hydraulically retractable, tricycle gear with air-hydraulic shock strut-type nose and main gear. The main gear has dual wheels and brakes on each strut. Each main gear wheel is equipped with two fusible plugs which will melt and release tire pressure in the event wheel temperature reaches 390°F. The brake system incorporates four power-boosted disc-type brakes with an integral anti-skid system. The nose gear utilizes a chined tire to prevent splashing into the engine inlet. Nose wheel steering is electrically controlled by the rudder pedals. Hydraulic pressure for gear retraction and extension is transmitted by a system of tubing, hoses, and actuating cylinders, and is electrically controlled by limit switches and solenoid valves. Alternate extension can be accomplished pneumatically in case of hydraulic or electrical system failure. Two doors enclose each main gear after retraction. The inboard doors are hydraulically operated and the outboard doors are mechanically operated by linkage connected to the main gear struts. The nose gear doors operate mechanically with linkage attached to the nose gear shock strut.



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LANDING GEAR EXTENSION/RETRACTION SCHEMATIC
Figure 3-2

LANDING GEAR SELECTOR SWITCH

The LANDING GEAR switch, located on the center instrument panel, is a lever-lock type switch and must be pulled aft before selecting the UP or DN position. The switch controls the position of the gear selector valve and the door selector valve through gear and door position switches. Electrical power for the control circuits is 28 VDC supplied through the 2-amp GEAR circuit breaker on the copilot's circuit breaker panel. The landing gear control circuits are operative during EMER BUS mode.

Landing gear retraction cycle: When the LANDING GEAR switch is placed in the UP position and the squat switches are in the air mode, the following sequence of events will occur:

1. 28 VDC will be applied to the "open" solenoid of the door selector valve and hydraulic pressure will be applied to both inboard main gear door uplock actuators and door actuators.

2. When the inboard main gear doors open, door open switches will complete a circuit from the LANDING GEAR switch to the "up" solenoid of the gear selector valve. Hydraulic pressure will be applied to the main and nose gear actuators and the gear will retract.

3. When the main gear retract, gear up switches will complete a circuit from the LANDING GEAR switch to the "close" solenoid of the door selector valve. Hydraulic pressure will be applied to the inboard main gear doors actuators to raise the gear doors. Additionally, a gear down safety switch will complete a circuit to the "up" solenoid of the gear selector valve to maintain continuous hydraulic pressure in the gear actuators.

4. The gear doors are latched by uplatch actuator spring tension.

Landing gear extension cycle: When the LANDING GEAR switch is placed in the DN position the following sequence of events will occur:

1. 28 VDC will be applied to the "open" solenoid of the door selector valve and hydraulic pressure will be applied to both inboard main gear door uplock actuators and door actuators.

2. When the main gear doors open, door open switches will complete a circuit from the LANDING GEAR switch to the "down" solenoid of the gear selector valve. Hydraulic pressure will be applied to the main and nose gear actuators and the gear will extend.

3. When the main gear are full down, gear down switches will complete a circuit from the LANDING GEAR switch to the "close" solenoid of the door selector valve. Hydraulic pressure will be applied to the inboard main gear door actuators to raise the gear doors. Additionally, a gear down safety switch will complete a circuit to the "down" solenoid of the gear selector valve to maintain continuous hydraulic pressure in the gear actuators.

4. The gear doors are latched by uplatch actuator spring tension.

LANDING GEAR POSITION LIGHTS

The landing gear position lights, consisting of a set of three UNSAFE/ DOWN lights arranged in a triangular pattern, are located on the LANDING GEAR control panel to the left of the LANDING GEAR selector switch. The UNSAFE portion of each light is red in color and equipped with dual bulbs. The DOWN portion of each light is green in color and equipped with dual bulbs. The location of each light in the triangular arrangement corresponds to the location of the gear on the aircraft. An UNSAFE (red) indication signifies that the corresponding gear is not in the down and locked position or that the corresponding main gear inboard door is open. A DOWN (green) indication signifies the corresponding gear is down and locked. During the gear retraction sequence, the three UNSAFE lights will illuminate when the sequence is initiated, remain illuminated throughout the retraction cycle, and then extinguish when the nose gear is up and locked and the main gear inboard doors close. During the gear extension sequence, the three UNSAFE lights will illuminate when the sequence is initiated, remain illuminated throughout the extension cycle, and then extinguish when the nose gear is down and locked and the main gear inboard doors close. The lights are operated by the same switches that control the landing gear extension and retraction cycles. The lights are dimmed when the navigation lights are on.

The lights may be tested at any time by depressing the warning light test switch (glareshield) or by using the GEAR function of the system test switch. When the system test switch is used, all of the landing gear panel indicator lights and mute light will illuminate and the landing gear warning horn will sound.

The landing gear position indicator lights operate on 28 VDC supplied through the 7.5-amp WARN LTS circuit breakers on the pilot's and copilot's circuit breaker panels. The position indicator lights are operative during EMER BUS mode. In the event of a complete DC electrical failure, the landing gear position lights will be powered by the emergency power system when the EMER BAT 1 Switch is in the ON position.

LANDING GEAR WARNING SYSTEM

A landing gear warning system is installed to warn the operator of potentially unsafe flight conditions with the landing gear retracted. The system consists of the landing gear warning horn, a thrust lever position switch, and flap position switches. The warning system also uses the landing gear position switches and UNSAFE lights. The ADCs (air data computers) provide the airspeed/altitude trip signal. Depending upon the flight condition encountered, one of two distinct warnings will be given as follows:

Warning horn sounds and UNSAFE lights illuminate — This indicates that the landing gear is not locked down, airspeed is below approximately 170 KIAS, altitude is below approximately 16,300 feet, and at least one thrust lever is below the 60% N_1 position. When the horn sounds under these conditions, the horn can be silenced by depressing the MUTE switch on the LANDING GEAR control panel or depressing the MUTE button in the right thrust lever handle. Whenever the warning horn has been muted, the amber MUTE light on the LANDING GEAR control panel will illuminate. The UNSAFE light indication will continue until either the landing gear is extended, airspeed is increased above 190 KIAS or one of the above conditions is corrected.

Warning horn sounds — Normally, sounding of the warning horn without a corresponding UNSAFE light indication signifies that the landing gear is not locked down and the flaps are lowered beyond 25°. When the horn sounds because the flaps are lowered, the horn cannot be silenced by either mute switch. The horn will continue to sound until either the landing gear is extended or the flaps are retracted.

LANDING GEAR ALTERNATE EXTENSION

In the event of a main hydraulic system failure or an electrical system malfunction, the landing gear can be extended pneumatically. Pneumatic gear extension can be accomplished by using either the alternate gear blow down system or the alternate gear free fall system. However, to assure adequate emergency air supply for emergency braking (hydraulic system failure) or to assure hydraulic pressure can be regained (electrical malfunction), it is recommended that blow down be selected first. If an attempt to blow down the gear is unsuccessful, alternate gear free fall should be selected. Air pressure to operate the blow down system is supplied by the GEAR AIR emergency air bottle and is controlled by the EMERGENCY BLOW DOWN GEAR lever on the right side of the pedestal. Air pressure to operate the free fall system is supplied by the BRAKE AIR emergency air bottle and is controlled by the EMERGENCY FREE FALL GEAR lever on the right side of the pedestal forward of the blow down lever. Whenever alternate gear extension is to be selected, the LANDING GEAR selector switch should be placed in the DN position and the GEAR circuit breaker on the copilot's circuit breaker panel should be pulled. This will prevent inadvertent gear retraction in the event electrical power to the system is regained.

GEAR BLOW DOWN

When the EMERGENCY BLOW DOWN GEAR lever on the right side of the pedestal is pushed full down (until lever latches), air pressure from the GEAR AIR emergency air bottle is admitted to the blow down system through the lever actuated blow down valve. Since the air pressure is greater than the landing gear system hydraulic pressure, shuttle valves in the landing gear system will reposition to admit air pressure to the landing gear system inboard main gear door and door uplock actuators, the main gear actuators, the nose gear uplock and gear actuators, the gear control valve, and the door control valve. The gear and door selector valves are positioned to "down" to prevent inadvertent gear retraction. When the landing gear is down and locked, the three green LOCKED DN lights will illuminate. The two main gear red UNSAFE lights will remain illuminated after gear extension due to the inboard main gear doors remaining open. When emergency gear blow down is selected, it is not required that the EMERGENCY BLOW DOWN GEAR lever be returned to the "up" position prior to landing. However, the lever must be returned to the "up" position prior to servicing either the GEAR AIR bottle or the hydraulic system. The EMERGENCY BLOW DOWN GEAR lever is returned to the "up" position by lifting the lever release (small metal tab available through a small hole immediately forward of the lever) and pulling the lever to the full up (latched) position.

GEAR FREE FALL

When the EMERGENCY FREE FALL GEAR lever on the right side of the pedestal is pushed full down (until lever latches), air pressure from the BRAKE AIR and free fall emergency air bottle is admitted to the free fall system through the lever actuated free fall valve. The air pressure is directly applied to an uplock actuator for each inboard main gear door, a nose gear uplock actuator, the door selector valve, the gear selector valve, and a hydraulic pressure shunt. The uplock actuators open the gear doors and release the nose gear uplock allowing the gear to free fall. The gear and door selector valves are positioned to "down" to prevent inadvertent gear retraction. The hydraulic pressure shunt diverts hydraulic system pressure to a hydraulic return line. Full gear extension should occur within 15 seconds with a complete loss of hydraulic pressure. When the landing gear is down and locked, the three green LOCKED DN lights will illuminate. The two outboard red UNSAFE lights will remain illuminated after extension due to the inboard main gear doors remaining open. When emergency gear free fall is selected, the EMERGENCY FREE FALL GEAR lever must be returned to the "up" position in order to retain BRAKE AIR bottle pressure for emergency braking (hydraulic system failure) or in order to allow the hydraulic shunt to reposition, allowing the hydraulic system to regain pressure (electrical malfunction). The EMERGENCY FREE FALL GEAR lever is returned to the "up" position by lifting the lever release (small metal tab available through the small hole immediately forward of the lever) and pulling the lever to the full up (latched) position.

NOSE WHEEL STEERING SYSTEM

The digital nose wheel steering system is a steer by wire system that receives pilot commands through dual rudder pedal position and dual rudder pedal force sensors. The computer processes information from the rudder pedal position and force sensors and three anti-skid wheel speed generators and steering authority is modified as a function of aircraft ground speed. For low speed ground operations 60° of steering authority either side of neutral is available. At low speed and large rudder pedal deflection the nose wheel displacement will be large for high maneuverability. Once a rudder pedal has reached its stop, further nose wheel displacement is generated by additional force being applied to that rudder pedal. As ground speed increases, the maximum wheel deflection is reduced to zero. At 90 knots 28 VDC is removed and the system disengages. Above 90 knots the nose wheel is allowed to castor. Nose wheel steering engage circuits are controlled through the momentary-action pedestal-mounted ARM/ NOSE STEER switch and the Control Wheel Master Switches (MSW). When the squat switches are in the ground mode, depressing and releasing the ARM/NOSE STEER switch will activate the computer when AC and DC power are available, the nose gear is down and locked, and no faults are detected by the system monitor. When the system is active the STEER ON annunciator on the glareshield and the ARM annunciator on the ARM/NOSE STEER switch will illuminate. At 90 knots, when the system disengages, the glareshield STEER ON annunciator will extinguish. When the nose gear is no longer in the down and locked position, the ARM annunciator on the ARM/ NOSE STEER switch will extinguish, however; the computer is still powered and system monitor circuitry remains active. When the nose gear is down and locked for landing the ARM annunciator on the ARM/NOSE STEER switch will illuminate provided no faults have been detected. After touchdown, when ground speed decreases to 90 knots, the STEER ON light on the glareshield will illuminate and steering authority will increase as ground speed decreases.

If the system cannot be armed, limited authority steering (24° either side of neutral) is available by depressing and holding either MSW. It should be noted that in some instances, even though a fault has been detected, the system will continue to function normally until shutdown. After that, however; it will not be possible to operate the system with full steering authority until the fault has been corrected. If the system cannot be accessed by either MSW, sufficient control is still available by differential braking.

The nose wheel steering system is powered by 28 VDC supplied through the 20-amp NOSE STEER circuit breaker and 115 VAC supplied through the 2-amp NOSE STEER circuit breaker in the TRIM-FLT CONT group on the copilot's circuit breaker panel.

STEER ON LIGHT

The green STEER ON light on the glareshield annunciator panel illuminates to indicate the nose wheel steering system is capable of responding to rudder pedal inputs.

ARM/NOSE STEER SWITCH

Normally, the ARM/NOSE STEER switch is used to activate nose steering circuits for taxi operations. Momentarily depressing the ARM/NOSE STEER switch will activate the system and the ARM annunciator will illuminate. When nose steering has been activated, the system can be disengaged by depressing then releasing either the pilot's or copilot's Control Wheel Master Switch (MSW) or by depressing the ARM/NOSE STEER switch a second time. The disconnect tone will sound.

CONTROL WHEEL MASTER SWITCH — NOSE STEERING FUNCTION

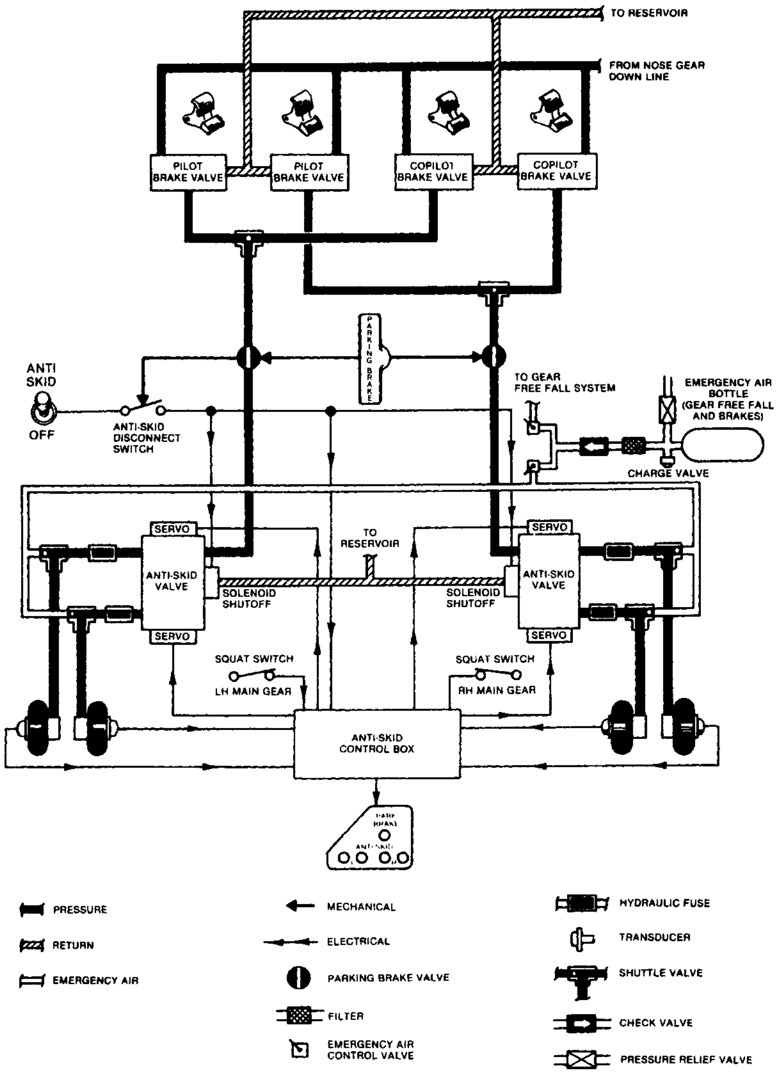
Depressing and holding either Control Wheel Master Switch (MSW) will engage the nose wheel steering system. While the MSW is held, the nose steering system will operate normally and the STEER ON annunciator will be illuminated. When the MSW is released, the nose wheel steering system will disconnect. The STEER ON annunciator will extinguish. In the event that nose wheel steering will not arm, the MSW can be depressed and held for limited authority steering, under some fault conditions.

WHEEL BRAKE SYSTEM

The primary brake system utilizes hydraulic system pressure for power boost. Hydraulic pressure from the nose gear down line is metered to the disc-type wheel brakes by the power brake valves. The valves are controlled by the rudder pedal toe brakes through mechanical linkage. Two shuttle valves in the pressure lines prevent fluid feedback between the pilot's and copilot's pedals. Four additional shuttle valves connect the pneumatic system to the brake system for emergency braking. Hydraulic fuses, located in the main gear wheel wells, will close to prevent pressure loss if fluid flow exceeds normal brake actuation rate. "Snubbing" of the main gear wheels is accomplished during retraction by means of hydraulic back pressure in the brake lines caused by a restrictor in the return line. An integral anti-skid system is installed to effect maximum braking efficiency. When parking, it is advisable to have the wheels chocked prior to releasing brakes.

PARKING BRAKE

The parking brake handle is labeled PARKING BRAKE and is located on the pedestal below the thrust levers. The handle is mechanically connected to the parking brake valve through which all pressure from the primary brake system must pass. The parking brake system is actuated by pressing and holding the toe brakes (hydraulic system pressurized) then pulling the parking brake handle which closes the parking brake valve, locking pressure against the wheel brakes. Pulling the parking brake handle also closes the solenoid shutoff valve on the anti-skid system to prevent leakage through the anti-skid valve. Returning the parking brake handle to the off position releases the brakes. The anti-skid system is inoperative when the parking brake is engaged.



20-27B

WHEEL BRAKE SYSTEM SCHEMATIC
Figure 3-3

PARK BRAKE LIGHT

An amber PARK BRAKE light, on the pilot's subpanel, immediately above the ANTI-SKID lights, is installed to alert the operator that the parking brake may be engaged. The light is operated by a switch attached to the parking brake valve and will be illuminated whenever power is on the aircraft and the PARKING BRAKE handle is not full in.

EMERGENCY BRAKING

In the event of a main hydraulic system failure, the wheel brakes can be applied pneumatically. Emergency (pneumatic) braking is initiated and controlled through the red EMER BRAKE handle located on the pedestal to the left of the thrust levers. Emergency braking is initiated by pulling the handle out of the recess and pushing down. As the EMER BRAKE handle is pushed down, air pressure from the BRAKE AIR emergency air bottle is directed to the wheel brake shuttle valves through the lever actuated emergency brake valve. If the emergency air pressure is greater than the brake system pressure, the wheel brake shuttle valves will reposition to admit air pressure to apply the brakes. As the brake handle is released, excess air will be vented overboard and the brakes will release. Because the emergency air lines are plumbed into the hydraulic brake system between the anti-skid control valves and the wheel brakes, anti-skid protection is not available when using emergency brakes. Also, the parking brake will be inoperative when using emergency air pressure.

ANTI-SKID SYSTEM

An anti-skid system is integrated into the hydraulic brake system to provide maximum braking efficiency under all runway surface conditions without skidding the tires. The system consists of the ANTI-SKID control switch, anti-skid control box, two anti-skid control valves, monitoring lights, four wheel-speed transducers (one in each main wheel axle), and associated aircraft wiring. Each anti-skid control valve is a dual unit capable of individually modulating brake pressure for both associated brakes. As the transducers are driven by the main wheels, a frequency proportional to the wheel speed is induced and forwarded to the control box. The control box converts the wheel-speed frequency to an analog signal and compares the analog to a reference representing the normal deceleration limits. Should the wheel speed deviate from the normal deceleration limits, the control box will signal the affected wheel's control valve to reduce braking pressure on the affected wheel. Braking pressure is reduced by bypassing some of the hydraulic system pressure into a return line by means of a servo controlled valve in the control valve. As the wheel speed increases, normal braking pressure is restored. To ensure full manual control of the hydraulic braking system and to prevent pressure loss when the parking brake is set, a solenoid-operated shutoff valve at each control valve return port is de-energized closed when the ANTI-SKID switch is OFF or the parking brake is set. Electrical power for the anti-skid system control circuits is 28 VDC supplied through the 7.5-amp ANTI-SKID circuit breaker in the hydraulics group on the copilot's circuit breaker panel.

ANTI-SKID LIGHTS

Four amber ANTI-SKID lights on the pilot's subpanel provide a continuous cockpit indication of the anti-skid system control circuits. The two lights labeled L represent control circuits for the left main gear brakes and the two lights labeled R represent control circuits for the right main gear brakes. The anti-skid control box continuously monitors the system circuits and will illuminate the applicable light(s) should any of the following conditions arise: loss of input power, open and short transducer circuits, open or short control valve circuits, and failure of control box circuits. Also, the lights will be illuminated any time the gear is down and locked, power is on the aircraft, and the ANTI-SKID switch is off.

ANTI-SKID SWITCH

The ANTI-SKID switch is located on the center switch panel and has two positions: On (ANTI-SKID) and OFF. When the switch is in the On (ANTI-SKID) position, 28 VDC is applied to the anti-skid system control circuits. Normally, the switch remains in the On (ANTI-SKID) position for all operations.

SECTION IV
ELECTRICAL & LIGHTING

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SECTION IV
ELECTRICAL & LIGHTING

DC POWER DISTRIBUTION

Primary electrical power for aircraft and avionics systems requiring DC power is supplied by two engine-driven, 30-volt, 400-ampere starter/generators. Secondary DC electrical power is supplied by two 24-volt lead-acid (standard) or nickel-cadmium (optional) batteries. An external power receptacle is installed for engine start and stationary ground operations.

A generator control unit (GCU) is installed for each starter/generator. The GCUs contain circuits to maintain generator output at approximately 28 VDC throughout varying engine speeds and loads. The GCUs also contain circuits to equalize generator load during parallel operation, provide overvoltage protection, and provide current limiting during ground operations and during generator-assisted cross starts.

During normal operation, the generators supply all aircraft DC power requirements. Regulated 28 VDC output from the generators is applied to the respective generator buses. The voltage on the generator buses is applied to the battery charging bus through 275-amp current limiters. Battery charge is maintained from the battery charging bus through the battery relays and battery buses. The DC BUS 2 and 3 buses in the circuit breaker panels are powered from the respective generator buses through 50-amp current limiters. The DC BUS 4 buses in the circuit breaker panels are powered from the battery charging bus through 40-amp current limiters. The battery bus in the pilot's circuit breaker panel is powered from the #1 battery through a 20-amp current limiter. The battery bus in the copilot's circuit breaker panel is powered from the #2 battery through a 10-amp current limiter. The DC BUS 1 buses in the circuit breaker panels are powered from the respective generator bus through an overload sensor and a control relay. A CABIN PWR BUS is installed in the pilot's circuit breaker panel. The CABIN PWR BUS is powered from the battery charging bus through a 100-amp current limiter, an overload sensor, and a control relay. The inverters are powered through overload sensors and control relays. Additionally, aircraft systems producing heavy loads; such as resistance heaters, freon compressor, large lamps, inverters, blowers, heavy-duty motors, and heavy-duty pumps, are supplied power through current limiters connected to either the battery charging bus or generator buses.

Overload sensors are installed between the DC BUS 1 buses and the associated generator bus. The overload sensors are installed to protect the DC BUS 1 feeder circuits from an overload. Basically, each overload sensor is a 70-amp circuit breaker mechanically connected to a switch. Should an overload condition occur, the circuit breaker will reposition the switch to de-energize a power relay, thereby disconnecting the DC BUS 1 bus. Additionally, the switch will apply a ground to trip the affected L or R DC BUS 1 circuit breaker. When the overload sensor circuit breaker cools, the switch will reset; however, the power relay will not re-energize due to the open L or R DC BUS 1 circuit breaker. When the malfunction has been corrected and the affected L or R DC BUS 1 circuit breaker reset, the power relay will re-energize and power to the DC BUS 1 bus will be restored. An overload sensor is installed between the CABIN PWR bus and the battery charging bus. The overload sensor is installed to protect the CABIN PWR BUS feeder circuit from an overload. Operation of the CABIN PWR BUS overload sensor is the same as that described for the DC BUS 1 overload sensors.

The generators will not come on-line if an operating ground power unit is connected to the aircraft.

A cross start relay box is installed which enables an operating generator to assist in providing power to start the opposite engine. If one generator is on-line and a start of the opposite engine is initiated, the cross start relay circuits will cause both left and right starter relays to close. In effect, this will bypass both battery charging bus 275-amp current limiters and the output of the operating generator will supplement the aircraft batteries in providing power for the starter.

An airstart relay box is installed which prevents the primary flight displays from blanking and ensures certain equipment, necessary for a successful start, has adequate voltage during airstarts. During an airstart, the #2 battery is isolated from the battery charging bus and its power is dedicated to the following loads:

- L & R STBY-SCAV PUMP
- L & R ENG CH A (FADEC)
- L & R ENG CH B (FADEC)
- L & R START
- ADC-ARP 1 & 2
- L & R JET PUMP-XFR VALVE
- L & R IGN CH A
- L & R IGN CH B
- AHS 1 & 2
- PFD 1 & 2

When the aircraft is on the ground, operation of the airstart circuits is inhibited and both batteries will be available to power the starter.

An emergency bus system is installed to operate selected equipment from the aircraft batteries for the maximum duration in the event of a dual generator failure. When the emergency buses are selected, the battery charging bus is isolated from the batteries and the equipment connected to the emergency buses will be powered from the aircraft batteries.

BATTERY SWITCHES

The aircraft batteries are controlled through the BATTERY 1 and 2 switches on the pilot's switch panel. The #1 battery is wired directly to the battery bus in the pilot's circuit breaker panel and the #2 battery is wired directly to the battery bus in the copilot's circuit breaker panel. When either BATTERY switch is placed in the On position, the corresponding battery relay closes to connect the respective battery bus to the battery charging bus if the EMER BUS switch is in the NORMAL position. When the BATTERY switch is placed in the OFF position, the battery relay is de-energized and the respective battery bus is isolated from the battery charging bus. The battery relays will also be de-energized whenever the EMER BUS switch is in the EMER BUS position.

START-GEN SWITCHES

The starter/generators are controlled through the START-L GEN and START-R GEN switches on the pilot's switch panel. Additionally, the START position of each switch is used to control various functions required for the starting sequence. These functions are described below. Each switch has three positions: START, OFF, and GEN. Prior to initiating the starting sequence, the associated thrust lever should be placed in the IDLE detent.

START position: With the BATTERY switches On, DC power from the L and R START circuit breakers is applied to the left and right START-GEN switches. When a START-GEN switch is set to START, DC power from the corresponding START circuit breaker is applied to close the corresponding starter relay, activate the corresponding standby pump, cause the corresponding motive flow valve to close, shutdown the cooling, auxiliary heating, and stabilizer heat systems, and energize the FADEC start sequence relay (supplies a discrete start signal to the FADEC). When the starter relay closes, the starter will

begin to spool the engine and the START light will illuminate. When N2 reaches approximately 6%, the FADEC automatically activates the ignition system and turns on fuel flow to the engine. When N2 reaches approximately 40%, the ignition will automatically terminate. When N2 reaches approximately 45%, a speed sensor in the starter/ generator will cause power to be removed from the starter relay (starter will be de-energized and the START light will extinguish) and from the FADEC start sequence relay (discrete start signal to FADEC will be removed and the corresponding motive flow valve will open). When the switch is moved out of the START position, the corresponding standby pump will shut down. If the associated thrust lever is not in the IDLE detent, ignition and fuel flow will not occur as stated above.

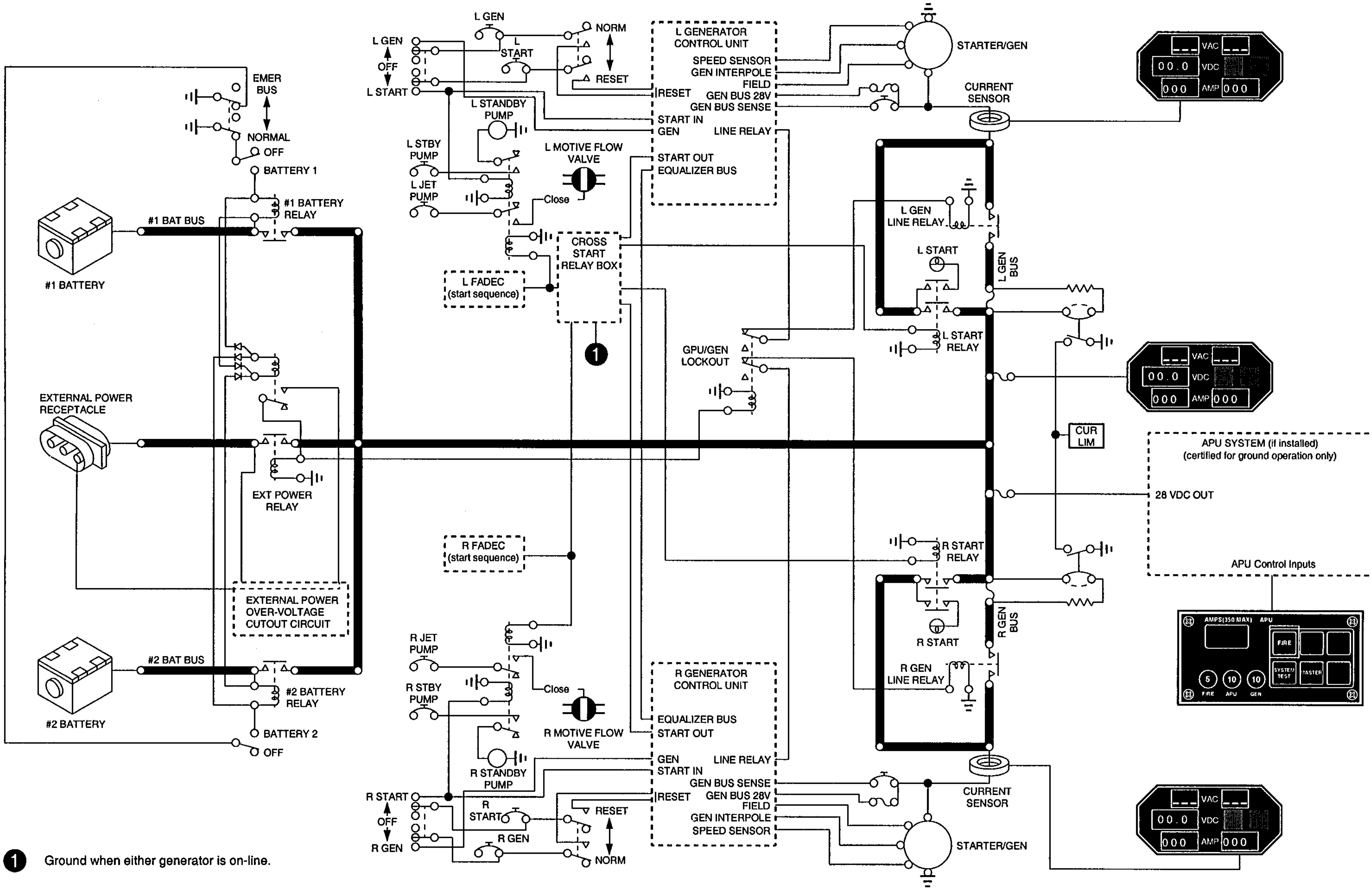
GEN position: During the engine start sequence, when engine RPM reaches idle speed, the START-GEN switch should be set to GEN. When GEN is selected, the corresponding generation circuits will be activated. The generator will not come on-line with a GPU connected. Additionally, the cooling and auxiliary heating systems, and stabilizer heat system cutout relays will be reset. The generation circuits activate and control the corresponding generator through the generator control unit.

START LIGHTS

Amber lights adjacent to each START-GEN switch are installed to indicate starter operation. The corresponding light will be illuminated whenever the associated starter is energized.

GEN RESET SWITCHES

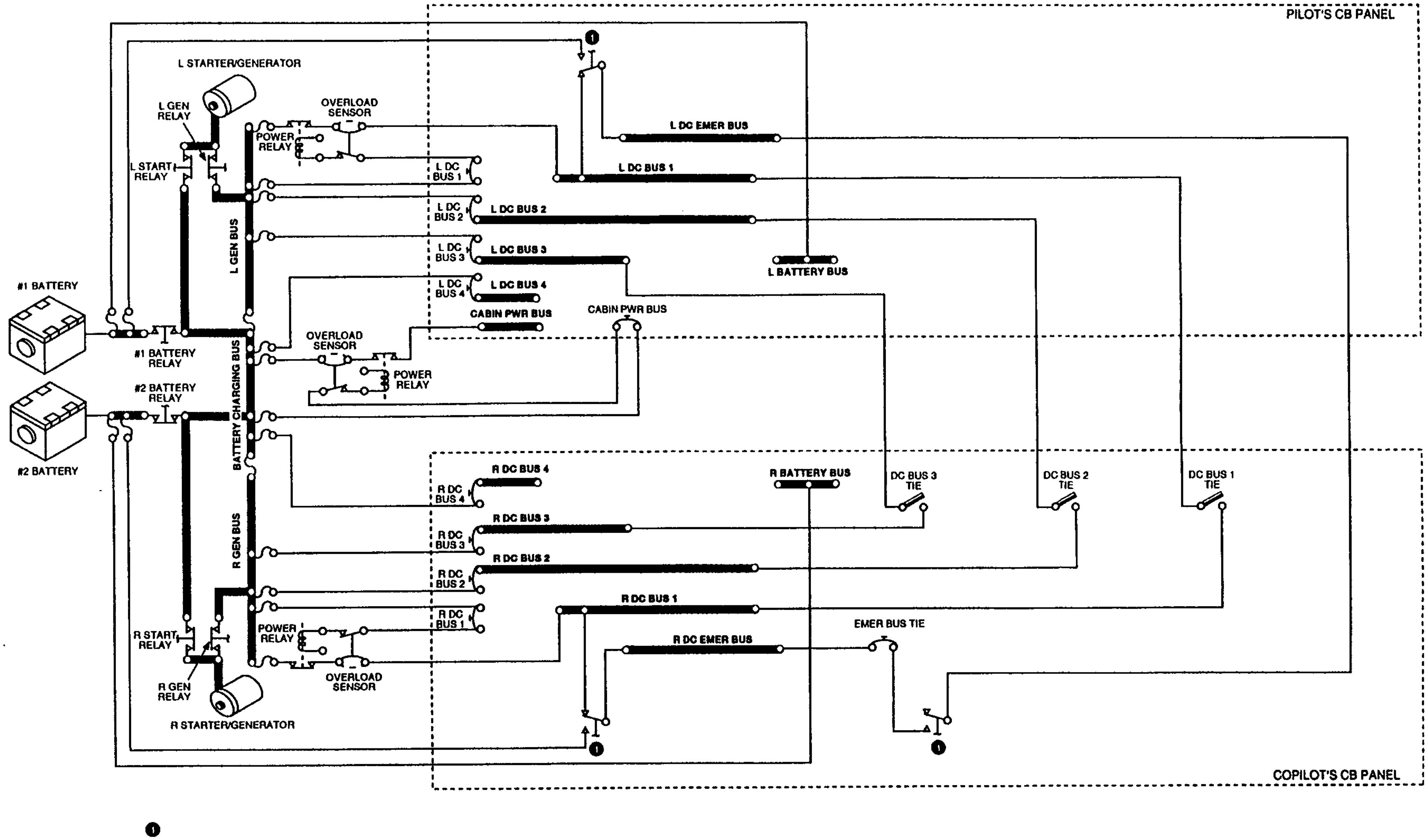
The GEN RESET buttons are located on the pilot's switch panel adjacent to the START-GEN switches. Should a generator fault occur, the corresponding generator control unit will de-energize the affected generator field circuit and open the generator relay isolating the generator from the respective generator bus. Momentarily depressing the applicable GEN RESET button will reset the generator by closing the affected generator field circuit and closing the generator relay. The GEN RESET buttons have no effect with the corresponding START-GEN switch OFF or the corresponding START and/or GEN circuit breaker open.



1 Ground when either generator is on-line.

NOTE: Airstart circuit not shown.

DC GENERATION AND START
Figure 4-1



DC POWER DISTRIBUTION
Figure 4-2

GEN LIGHTS

Amber L GEN and R GEN annunciator lights are installed in the glareshield annunciator panel. The lights are controlled by the corresponding generator control circuits and will illuminate whenever the corresponding generator has failed or is off the line. The light will also illuminate whenever the corresponding START-GEN switch is in either START or OFF and at least one BATTERY switch is On.

CUR LIM LIGHT

The amber CUR LIM annunciator light, on the glareshield annunciator panel, is installed to indicate the continuity of the 275-amp current limiters. The 275-amp current limiters connect the battery charging bus to the generator buses. Failure of both 275-amp current limiters will cause the equipment connected to the battery charging bus to be powered from the ship's batteries only. The light is illuminated by sensors wired across the current limiter terminals. A failure of either current limiter will cause the respective sensor to illuminate the CUR LIM light.

DC CIRCUIT BREAKERS

The aircraft DC electrical circuits are protected by push-to-reset, thermal-type circuit breakers. Most DC circuit breakers are located on the pilot's and copilot's circuit breaker panels. The L and R DC BUS 1, DC BUS 2, and DC BUS 3 buses may be interconnected through the DC BUS 1 TIE, DC BUS 2 TIE, and DC BUS 3 TIE circuit breaker/switches on the copilot's circuit breaker panel. Normally the L and R DC buses are not tied together. If it is desired to tie a L DC BUS and R DC BUS together, the appropriate DC BUS TIE circuit breaker/switch must be in the up (closed) position. The DC BUS 1 circuit breaker on each circuit breaker panel controls power to the associated DC BUS 1 bus through control relays. Circuit breakers are grouped together into system types (e.g. ELECTRICAL, LIGHTS, AVIONICS). Power to operate the emergency bus system is supplied from the batteries through the respective EMER BUS CONT circuit breaker (see figure 4-4). The circuit breakers for equipment powered during EMER BUS mode are denoted by red rings on the overlay.

BATTERY OVERHEAT WARNING SYSTEM

On aircraft equipped with nickel-cadmium batteries, a battery overheat warning system is installed to warn the operator of an impending battery overheat condition. The system consists of two thermoswitches installed in each battery, a temperature sensor in each battery, two overheat warning lights, a temperature indicator, and associated aircraft wiring.

BAT 140 AND BAT 160 LIGHTS

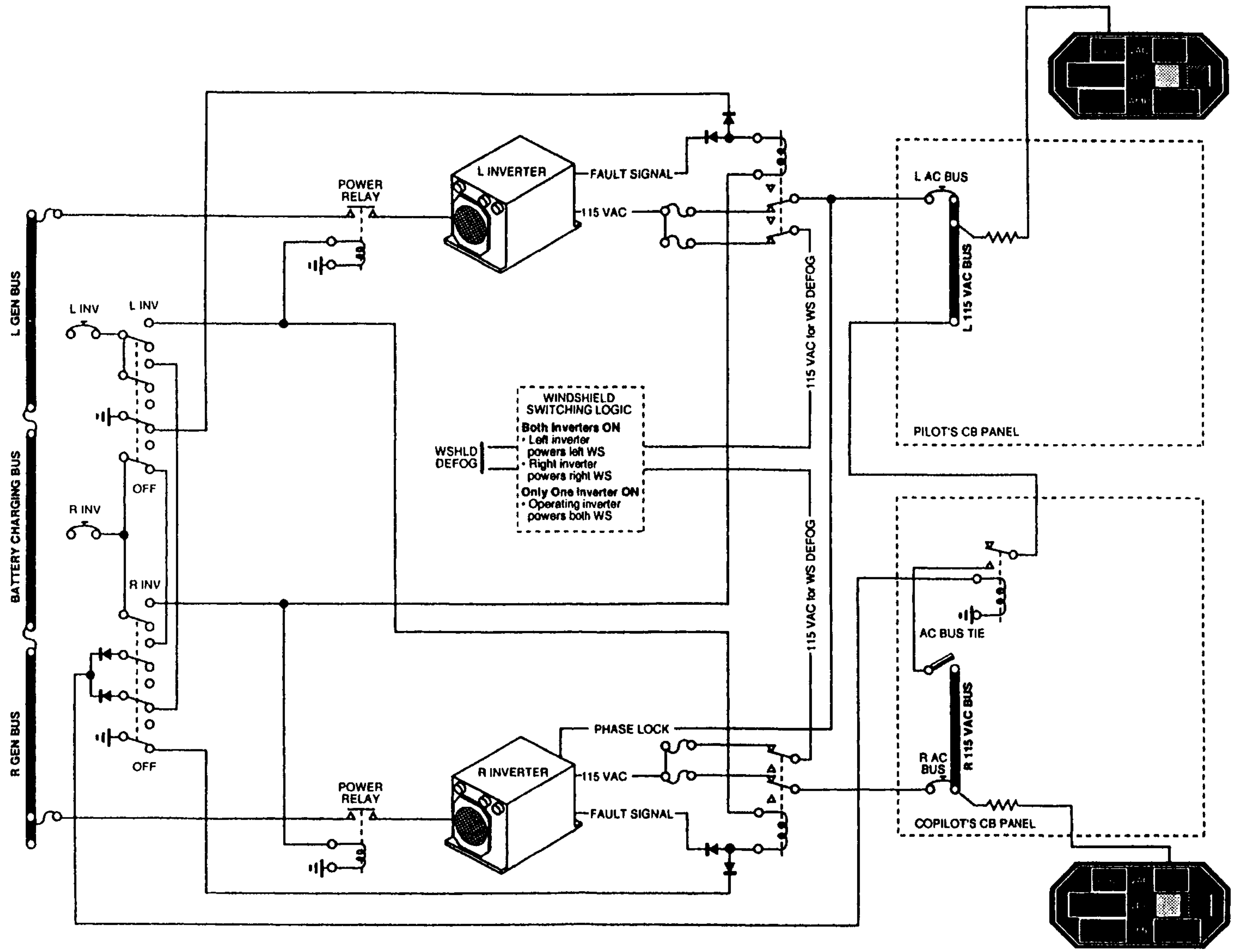
The red BAT 140 and BAT 160 warning lights on the glareshield annunciator panel are installed to warn the pilot that a battery is overheating. The lights are operated by thermoswitches installed in the battery links. The BAT 140 light will illuminate in the event either battery reaches a temperature of 140°F. The BAT 160 light will illuminate in the event either battery reaches a temperature of 160°F. Since both BAT 140 thermoswitches and both BAT 160 thermoswitches are wired together, the pilot must refer to the BAT TEMP indicator to determine the malfunctioning battery.

BAT TEMP INDICATOR

The BAT TEMP indicator is a dual-reading, vertical-scale instrument and is usually located in the copilot's instrument panel. The indicator face consists of a center scale marked from 50°F to 200°F in 25°F increments and two pointers on opposite margins of the scale. The pointer indicating #1 battery temperature is on the left margin and the pointer indicating #2 battery temperature is on the right margin. Each pointer is operated by a temperature sensor installed in the corresponding battery cell links. Electrical power to the indicator is 28 VDC supplied through the 1-amp BAT TEMP circuit breaker on the pilot's circuit breaker panel.

EXTERNAL POWER RECEPTACLE

External power may be connected to the aircraft DC electrical distribution system through a standard receptacle located on the right fuselage below the pylon. To start an engine or operate aircraft systems using external power at least one BATTERY switch must be in the On position; however, the generators will not come on-line with an external power source connected. External power over-voltage protection circuits will open the external power relay and disconnect external power from the aircraft DC distribution system in the event the external power source exceeds approximately 32 volts. External power source amperage must be limited to a maximum of 1500 amps as specified on the placard above the external power receptacle.



AC POWER AND DISTRIBUTION
Figure 4-3

AC POWER DISTRIBUTION

Electrical power for aircraft and avionics systems requiring AC power is supplied through two 115-volt, 400-Hz, 1500VA, solid-state inverters. During normal operation, the left and right inverter output voltages are applied to the left and right AC buses respectively. The left and right AC buses may be interconnected through the 7.5-amp AC BUS TIE circuit breaker/switch on the copilot's circuit breaker panel. Each AC bus is intended to be powered by only one inverter. Therefore, the AC BUS TIE switch should only be closed after removing power from one of the buses and setting the respective INVERTER switch to OFF. If both INVERTER switches are On, a relay in the copilot's circuit breaker panel will prevent the AC BUS TIE from functioning (electrically). An inverter relay box controls 28 VDC input to the inverters and provides isolation between the inverter output and AC bus should an inverter fault occur. A phase lock function within the right inverter keeps the output of each inverter in-phase. Input power to operate the left and right inverters is 28 VDC supplied through 100-amp current limiters connected to the left and right generator buses respectively.

INVERTER SWITCHES

Operation of the left and right inverters is controlled through the two INVERTER switches on the pilot's switch panel. The switch controlling the left inverter is labeled L-OFF and the switch controlling the right inverter is labeled R-OFF. When either switch is moved to the On (L or R) position, the associated power relay is energized to supply input power to the associated inverter. When one switch is On and the other is OFF, a relay in the inverter relay box is energized isolating the inoperative inverter from its associated AC bus. The inverter control circuits operate on 28 VDC supplied through the 2-amp L INV and R INV circuit breakers on the pilot's and copilot's circuit breaker panels respectively.

AC CIRCUIT BREAKERS

The aircraft AC electrical circuits are protected by push-to-reset magnetic-type circuit breakers. AC circuit breakers are denoted by a white ring on the panel overlay. The copilot's circuit breaker panel also contains the AC BUS TIE circuit breaker/switch which is used to tie the L AC BUS and R AC BUS together in the abnormal situation of single inverter operation. Circuit breakers are grouped together into system types (e.g. ELECTRICAL, AFCS, AVIONICS).

ELECTRIC POWER MONITOR

An electric power monitor is installed on the pilot's instrument panel to monitor left and right AC bus voltage, left and right DC generator load and the DC charging bus voltage. Digital displays are used for voltage and amperage readouts. Each parameter being monitored is divided into Normal, Caution and Warning ranges. Refer to Airplane Flight Manual for instrument range description. Whenever any parameter goes from the normal range to the caution range, the indicator's amber light and affected parameter will flash. If the parameter progresses into the warning range, the indicator's red light and affected parameter will flash. The amber ELEC PWR light (annunciator panel) will illuminate (steady or flashing) anytime an amber or red light on the indicator is illuminated (steady or flashing). Whenever any parameter goes into the caution range, the Master CAUT lights will flash. Whenever any parameter goes into the warning range, the Master WARN lights will flash. Depressing the amber or red light, as applicable, will cause the lights and displays to stop flashing. Depressing either Master CAUT/Master WARN light will cancel the flashing of amber and red warnings, the affected parameter and the amber ELEC PWR light. The amber or red light will remain illuminated (steady) until the affected parameter returns to the normal range. Caution and warning annunciations are inhibited during starter engagement.

A malfunction which affects the accuracy of the indicator will cause EE.E to be displayed in the VDC readout and dashes "-" in all other readouts.

Whenever the left and right inverters are out-of-phase, a "C" will flash in the least significant digit of each VAC display. The electric power monitor is operative during EMER BUS mode.

AUTOMATIC LOAD SHEDDING SYSTEM

An automatic electrical load-shedding system is installed to automatically reduce generator loading in the event of a single generator failure. The system is only active during flight (weight not on wheels). Should either L or R GEN light illuminate in flight, the following loads will automatically shut down to reduce the load on the operating generator:

- CABIN PWR BUS Loads
- Air Conditioning System
- Cockpit Floorboard Heater System (if installed)
- Baggage Compartment Heater System (if installed)

If the generator is brought back on-line, these loads will be regained.

EMERGENCY BUS SYSTEM

An emergency bus system is installed to provide 28 VDC to selected systems in the event of a dual generator system failure or to quickly de-energize and isolate all nonessential equipment in the event of electrical smoke or fire. The system uses the aircraft's batteries to supply DC power to the DC equipment on the emergency bus. All emergency bus circuit breakers are denoted by a red ring on the panel overlay. The EMER BUS TIE is located on the copilot's circuit breaker panel. The emergency bus system control circuits operate on 28 VDC supplied by the batteries through the EMER BUS CONT circuit breakers in the pilot's and copilot's circuit breaker panel.

CABIN POWER CONTROL SWITCH

The cabin power control switch system adds a CABIN PWR OFF switch inline with the CABIN PWR BUS circuit breaker. This allows the pilot to quickly and efficiently load shed all cabin power systems by selecting the CABIN PWR switch to the OFF position. When the switch is selected CABIN PWR — OFF, it will also disable the NO SMOKING/ FASTEN SEATBELT sign. Also, selecting CABIN PWR— OFF is one means of reducing generator loads when required by abnormal procedures in the FAA Approved Flight Manual. During single-generator operation, the aircraft load shed will automatically cause the CABIN PWR to go to the OFF mode.

EMER BUS SWITCH

The EMER BUS switch on the pilot's switch panel is used to select the power source for the emergency buses. The switch has two positions— EMER BUS and NORMAL.

When the EMER BUS switch is in the NORMAL position, the emergency bus system relays will be de-energized and equipment on the emergency buses will be powered from the normal electrical system. DC equipment on the emergency buses will be powered through the associated DC BUS 1, 2, or 3. When the switch is in the EMER BUS position, the battery relays will be de-energized, the emergency bus system relays will be energized, and equipment on the emergency buses will be powered through the emergency bus system. When the battery relays are de-energized, the aircraft batteries are completely isolated from the battery charging bus and the normal DC power distribution system. When EMER BUS is selected, electrical power will be distributed as follows:

1. DC power for the primary pitch trim motor will be switched from the battery charging bus to the #1 aircraft battery.
2. DC power for the auxiliary hydraulic pump will be switched from the battery charging bus to the #2 aircraft battery.
3. DC power to heat the standby pitot-static probe will be switched from the battery charging bus to the #2 aircraft battery.
4. DC powered equipment on the emergency buses will be switched from the associated DC BUS 1 to the aircraft batteries.
5. The DC voltmeter will display the voltage of both batteries (EMER BUS TIE must be closed).

NOTE

- The conditions just described assume that both BATTERY switches are in the On position.
- If only the BATTERY 1 switch is On, the auxiliary hydraulic pump will not be available, heat for the standby pitot-static probe will not be available, and the DC voltmeter will display the voltage of the #1 battery. All other conditions will be as described.
- If only the BATTERY 2 switch is On, Primary Pitch Trim will not be available and the DC voltmeter will display the voltage of the #2 battery. All other conditions will be as described.

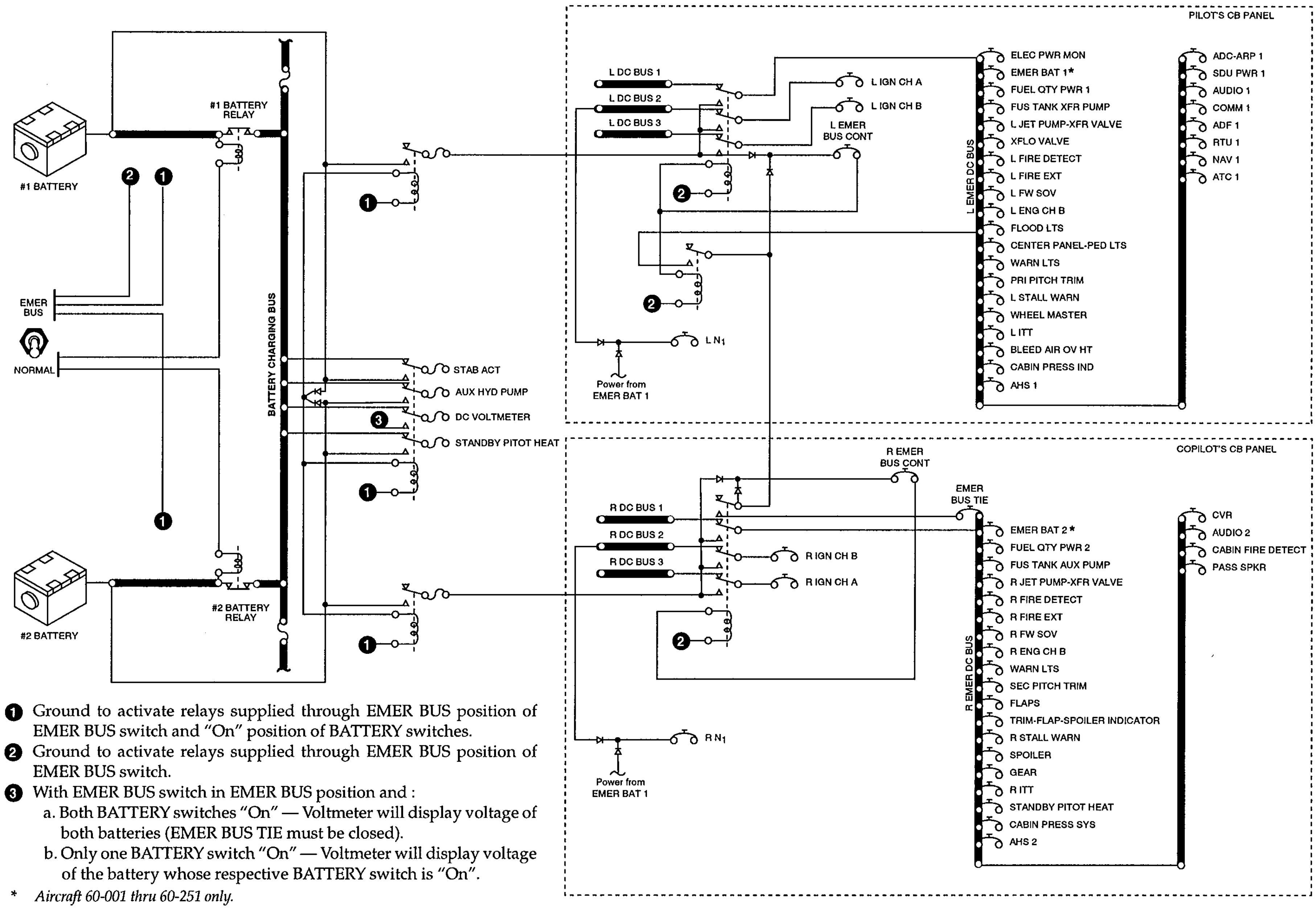
AVIONICS POWER SYSTEM

An avionics power system is installed to allow selected DC powered avionics systems to be powered up through the use of two master switches. The system consists of a LEFT MASTER and RIGHT MASTER switch, and a control relay in each circuit breaker panel. The control relays operate on 28 VDC supplied through the corresponding 1-amp AVIONICS MASTER circuit breaker in the associated circuit breaker panel. The AVIONICS MASTER switches have no effect when EMER BUS is selected and the generators are off-line.

AVIONICS MASTER SWITCH

The LEFT MASTER switch is installed in the pilot's switch panel and the RIGHT MASTER switch is installed in the copilot's switch panel. These two switches allow the crew to turn groups of avionic equipment off and on with only two switches.

Refer to the Airplane Flight Manual for a listing of equipment controlled by the MASTER switches. The actual equipment affected may vary with customized wiring options.



1. Ground to activate relays supplied through EMER BUS position of EMER BUS switch and "On" position of BATTERY switches.
2. Ground to activate relays supplied through EMER BUS position of EMER BUS switch.
3. With EMER BUS switch in EMER BUS position and :
   a. Both BATTERY switches "On" — Voltmeter will display voltage of both batteries (EMER BUS TIE must be closed).
   b. Only one BATTERY switch "On" — Voltmeter will display voltage of the battery whose respective BATTERY switch is "On".

* *Aircraft 60-001 thru 60-251 only.*

EMERGENCY BUS SYSTEM
Figure 4-4

EMERGENCY POWER SYSTEM

The aircraft is equipped with either a single, dual or triple emergency power system to supply electrical power to selected equipment in the event of a normal electrical power system failure. Operating time of equipment powered by the emergency power supply is presented in the Airplane Flight Manual. Power for the emergency power system is supplied by two emergency power supply units located in the right, aft, nose avionics compartment. Each emergency power supply unit contains a 12-cell lead-acid battery to provide electrical power. The emergency power supply batteries are trickle charged from the aircraft normal electrical system through the 15-amp EMER BAT circuit breakers on the pilot's and copilot's circuit breaker panels.

If the normal electrical system has failed, and only one emergency backup is installed, EMER BAT 1 power supply will provide electrical power for the standby attitude indicator, N1 indicators, selected instrument lights (standby attitude indicator, N1 indicators, standby airspeed indicator, standby altimeter, and magnetic compass), gear position lights, NAV 1 and RTU 1; If a second emergency backup battery is installed, EMER BAT 2 will supply electrical power for gear position lights, NAV 1, RTU 1 and backup power for the Attitude Heading Reference System (AHS 1 & 2), air data computers (ADC 1 & 2); If a third emergency backup battery is installed, EMER BAT 3 will supply emergency power to FMS 1 and VHF COMM. Additionally, this will allow programming of FMS 1 on the ground when a GPU or APU is not available. The system is controlled through the EMER BAT 1, EMER BAT 2, and EMER BAT 3 switches on the pilot's switch panel. Amber EMR PWR 1, EMR PWR 2 and EMR PWR 3 annunciators on the center instrument panel will illuminate whenever electrical power from the associated emergency power supply is being used.

On aircraft 60-001 thru 60-248, standby power for N1 indicators are powered by EMER BAT 1.

On aircraft 60-249 and On, standby power for N1 indicators are powered by EMER BAT 2.

EMER BAT SWITCH

The EMER BAT switches have two positions: On (EMER BAT 1, 2, 3) and OFF. With a switch in the On position, electrical power from the corresponding emergency power supply battery is available to supply emergency power should the normal electrical system fail. Normally, electrical power from the emergency power supply batteries is not used because 28 VDC from the normal electrical system is balanced against it. In the event of a failure of the normal electrical system, the balanced condition is removed and electrical power from the emergency power supplies will illuminate the EMR PWR annunciators, and operate the standby attitude indicator, N1 indicators, selected instrument lights (standby attitude indicator, N1 indicators, standby airspeed indicator, standby altimeter, and magnetic compass), landing gear position lights, NAV 1, RTU 1, COM 1, FMS 1 and AHS 1 & 2. Additionally, ADC 1 & 2 will be powered up while the EMER BUS switch remains in the NORMAL position.

AUXILIARY POWER UNIT (APU) GENERATOR

The optional APU generator provides 28 volts DC electrical power to the aircraft battery charging bus. The generator is controlled by a Generator Control Unit (GCU). The APU is only certified for ground use. After starting the APU using the APU control panel on the copilot's circuit breaker panel, the green APU RUNNING annunciator will illuminate indicating that the APU system is ready to supply power to the aircraft. Refer to Auxiliary Power Unit in Section II of this manual.

EXTERIOR LIGHTING

LANDING/TAXI LIGHTS

A landing/taxi light is installed on each main landing gear. The lights are controlled by the LDG LT switches on the center switch panel. The LDG LT switches have three positions: On (L and R), TAXI, and OFF. The landing light control circuits are wired through the main gear down-and-locked switches; therefore, the landing lights are inoperative when the landing gear is not down and locked. When the LDG LT switches are placed in the On position, control circuits apply full 28 VDC to the landing lights and the lights will illuminate full bright. When the LDG LT switches are in the TAXI position, resistors shunt the lamp input power to 21 VDC and the lights are dimmed. In order to extend the service life of the lamps, it is recommended that the lights be used as sparingly as possible in the LDG LT mode. The lamps and control circuits are supplied electrical power through 20-amp current limiters.

Some aircraft are equipped with a pulsating landing light option which is used in conjunction with the pulsating recognition light. On these aircraft, a pulse controller unit controls the landing lights by delivering pulsating DC current at approximately 45 cycles per minute. The effect of this pulsating current is to cause the bulb's brightness to continually vary between approximately 40% and 100% of full bright. The pulsating feature is activated when the RECOG light switch is set to the PULSE position, the applicable LDG LT switch is OFF and the landing gear is down and locked. When the LDG LT switch is positioned to On or TAXI, the landing/taxi lights will illuminate steadily.

NAVIGATION LIGHTS

Navigation lights are installed in the forward portion of the wing tips and in the vertical stabilizer upper aft fairing (bullet). The lights are controlled through the NAV switch in the LIGHTS group on the center switch panel. When the NAV light switch is placed in the On (NAV) position, the navigation lights will illuminate. Additionally, setting the NAV light switch to On (NAV) activates two-stage dimming and certain cockpit lights are automatically dimmed. Refer to TWO-STAGE DIMMING, this section. Electrical power for the navigation lights is 28 VDC supplied through the 7.5-amp NAV LTS circuit breaker on the pilot's circuit breaker panel.

TAIL LOGO LIGHTS (OPTIONAL)

Optional tail logo lights may be installed in the horizontal stabilizer on either side of the vertical stabilizer. These lights are used to illuminate both sides of the vertical stabilizer. The lights are controlled through the NAV switch in the LIGHTS group on the center switch panel.

Aircraft with NAV LOGO-NAV-OFF Switch: When the NAV light switch is placed in the NAV LOGO position, the tail logo lights and navigation lights will illuminate. To use the navigation lights without the tail logo lights, select the NAV position of the switch.

Aircraft with NAV-OFF Switch: When the NAV light switch is placed in the NAV position, the tail logo lights and navigation lights will illuminate.

Electrical power for the tail logo lights is 28 VDC supplied through a 15-amp current limiter. Power for the control circuit is 28 VDC supplied through the 1-amp LOGO LT circuit breaker on the copilot's circuit breaker panel.

ANTI-COLLISION (BEACON/STROBE) LIGHTS

Anti-collision lights are mounted on top of the vertical stabilizer and on the bottom of the fuselage. Each light incorporates two flashtubes — one with an aviation red filter and one with a clear filter. The lights are controlled through the BCN/STROBE light switch in the LIGHTS group on the center switch panel.

On aircraft not modified by SB-60-33-7 (Modification of Strobe Light Switch), when the switch is placed in the BCN/STROBE position, the red flashtube in each light will flash if the aircraft's weight is on the wheels or the clear flashtube will flash if the aircraft's weight is not on the wheels.

On aircraft modified by SB-60-33-7 (Modification of Strobe Light Switch), when the switch is placed in the STROBE position, the white flashtube in each light will flash whether or not the aircraft's weight is on the wheels.

When the switch is placed in the BCN/STROBE position, the red flashtube in each light will flash if the aircraft's weight is on the wheels or the clear flashtube will flash if the aircraft's weight is not on the wheels. When the switch is placed in the BCN position, the red flashtube in each light will flash whether or not the aircraft's weight is on the wheels. Therefore, when the clear strobe light is not desired in flight, the switch must be set to BCN or OFF. Each flashtube pulses at a rate of approximately 50 pulses per minute. The lights operate on 28 VDC supplied through the 7.5-amp BEACON-STROBE LTS circuit breaker on the copilot's circuit breaker panel.

RECOGNITION LIGHT

A recognition light is installed on the upper, leading edge of the vertical stabilizer. The light is controlled through the RECOG light switch in the LIGHTS group on the center switch panel. When the switch is placed in the On (RECOG) position, control circuits apply full 28 VDC from the battery charging bus to illuminate the light. For greatest lamp life, it is recommended that the recognition light be turned OFF at altitudes of 18,000 feet or above. The recognition light operates on 28 VDC supplied through a 20-amp current limiter.

Some aircraft are equipped with a pulsating recognition light option. On these aircraft, the RECOG light switch has a middle position labelled PULSE and a pulse controller unit. When the switch is placed in the PULSE position, 28 VDC from the PULSE RECOG LT circuit breaker is applied to the pulse controller unit which in turn lights the recognition light by delivering pulsating DC current at approximately 45 cycles per minute. The effect of this pulsating current is to cause the bulb's brightness to continually vary between approximately 40% and 100% of full bright. This feature results in enhanced aircraft recognition and improved bulb life. Also, the landing lights will pulse alternately with the recognition light if the landing gear is down and locked and the LDG LT switches are OFF. On aircraft with a pulsating recognition light, a 1-amp PULSE RECOG LT circuit breaker on the copilot's circuit breaker panel supplies 28 VDC to the pulse controller unit.

WING INSPECTION LIGHT

For a description of the wing inspection light, refer to Section VI, ANTI-ICE AND ENVIRONMENTAL.

EXTERIOR CONVENIENCE LIGHTS (OPTIONAL)

An exterior convenience lighting option is available which installs a light on the underside of each engine pylon. The lights will illuminate the area around the tailcone baggage compartment and the single-point pressure refueling access. The lights are controlled by the entry light switch located near the entry door and are inoperative when the aircraft is in flight.

COCKPIT LIGHTING

INSTRUMENT PANEL FLOODLIGHTS

Three cold-cathode, fluorescent lights are installed in the glareshield assembly to provide flood illumination of the instrument panel. Electrical power to operate the lights is 600 VAC supplied through two power supply units. The lights are controlled and dimmed through the FLOOD rheostat switch on the pilot's switch panel. Electrical power to the power supply units is 28 VDC supplied through the 7.5-amp FLOOD LTS circuit breaker on the pilot's circuit breaker panel. Instrument panel floodlights are operative during EMER BUS mode.

INSTRUMENT LIGHTS

Incandescent lighting is installed for the pilot's indicators, copilot's indicators, center instrument panel indicators, pedestal indicators, and magnetic compass. The lights are powered by variable voltage (0 - 5 VDC) current supplied by five power supply units. Electrical power to the power supply units is 28 VDC supplied through the 5-amp L and R INSTR LTS circuit breakers and the 7.5-amp CENTER PANEL-PED LTS circuit breaker on the pilot's and copilot's circuit breaker panels. The lights are controlled and dimmed by the INSTR and CENTER PNL/PEDESTAL rheostat switches on the pilot's switch panel and the INSTR rheostat switch on the copilot's switch panel.

Pilot's INSTR dimmer switch: The pilot's INSTR dimmer switch provides variable dimming for the following:

- L & R N_1 indicators
- L & R N_2 indicators
- L & R ENG OIL indicators
- Pilot's clock
- Electric power monitor
- L & R ITT indicators
- L & R Fuel Flow indicators
- Pilot's angle-of-attack indicator
- Oxygen pressure indicator

Copilot's INSTR dimmer switch: The copilot's INSTR dimmer switch provides dimming for the following:

- Copilot's clock
- TEMP CONT indicator
- Pressurization panel
- CAB TEMP indicator
- Copilot's angle-of-attack indicator
- Cabin pressure indicator

CENTER PNL/PEDESTAL dimmer switch: The CENTER PNL/PEDESTAL dimmer switch on the pilot's switch panel provides dimming for the following:

- Autopilot panel
- Standby attitude indicator
- Magnetic compass
- WING TEMP indicator
- SPOILER indicator
- FLAP indicator
- Fuel control panel
- Trim switch panel
- Passenger briefer panel
- Standby airspeed indicator
- Standby altimeter
- Fuel quantity indicator
- HYD PRESS indicator
- GEAR & BRAKE AIR indicator
- Trim indicators (pitch, roll, yaw)
- NOSE STEER switch
- HF control head
- UNS-1 CDU and ERP panels

Two master instrument light switches may be installed. They consist of two INSTR LIGHTS MASTER switches and the associated aircraft wiring. One master switch is located in the L INSTR LIGHTS group on the pilot's switch panel and the other is located in the R INSTR LIGHTS group on the copilot's switch panel. The WING INSP LIGHT switch, normally located on the copilot's switch panel, may be relocated to a position on the instrument panel. The INSTR LIGHTS MASTER switches allow certain cockpit lighting to be turned on and off using one switch instead of multiple switches. The following lighting groups are controlled by the INSTR LIGHTS MASTER switches:

L INSTR LIGHTS
- EL PNL
- CB PNL
- INSTR
- CENTER PNL/PEDESTAL

R INSTR LIGHTS
- EL PNL
- INSTR
- CB PNL

The individual controls are used to select the brightness level of the affected instrument lights and the master switch is used to turn the lighting groups off and on as desired.

TWO-STAGE LIGHTING

Certain lights are automatically dimmed when the NAV light switch is set to NAV. When the NAV light switch is set to OFF, full 28 VDC is applied to the lights allowing them to illuminate at full brightness. When the NAV light switch is set to NAV, the voltage applied to the lights is reduced to approximately 14 VDC reducing their brightness. The lights dimmed by the two-stage dimmers are:

- Autopilot controller
- ANTI-SKID lights
- IGNITION lights
- Fuel control panel lights
- SELCAL panel lights
- EFIS reversionary mode lights
- LINE ADV switch
- PARK BRAKE light
- START lights
- Pressurization FAULT/MANUAL light
- Pressurization EMER DEPRESS light
- CVR TEST & CVR ERASE switches
- Landing gear UNSAFE/DOWN lights
- NOSE STEER ARM annunciator

SWITCH PANEL LIGHTING

Electroluminescent panel lighting is provided for the pilot's and copilot's switch panels, the center switch panel, audio control panels, MIC/PHONE jack panels, the pressurization control panel, anti-skid panel, system test switch panel, landing gear control panel, rudder pedal adjust panels, Altitude Awareness Panels (AAP), Air Data Reference Panels (ARP), and circuit breaker panels. The panels are supplied 115 VAC through the 5-amp L and R EL LTS circuit breakers on the pilot's and copilot's circuit breaker panels. The lights are controlled and dimmed through the EL PNL and CB PNL rheostat switches on the pilot's and copilot's switch panels.

Pilot's EL PNL and CB PNL dimmer switches: The pilot's EL PNL dimmer switch controls the electroluminescent lighting of the pilot's inboard and outboard switch panels, the center switch panel, the pilot's audio control panel, the pilot's rudder pedal adjust panel, the anti-skid panel, the system test switch panel, the landing gear control panel, the pilot's AAP and ARP panels, throttle quadrant overlay, and the engine synchronizer switch panel. The pilot's CB PNL dimmer switch controls the electroluminescent lighting of the pilot's circuit breaker panel, and MIC/PHONE jack panel.

Copilot's EL PNL and CB PNL dimmer switches: The copilot's EL PNL dimmer switch controls the electroluminescent lighting of the copilot's switch panel, the pressurization control panel, the copilot's audio control panel, the copilot's AAP and ARP panels, and the copilot's rudder pedal adjust panel. The copilot's CB PNL dimmer switch controls the electroluminescent lighting of the copilot's circuit breaker panel, and MIC/PHONE jack panel.

EFIS LIGHTING

The brightness of the EFIS tubes is controlled by two EFIS dimmer controls — one on the pilot's switch panel and one on the copilot's switch panel. Each EFIS control is used to adjust the brightness of the on-side primary flight display (PFD), multi-function display (MFD), radio tuning unit (RTU), and control display unit (CDU). The pilot's EFIS control adjusts the sensor display unit (SDU) brightness. On the UNS-1 CDU, the screen lighting is controlled by the ON/OFF/DIM key. When pressed, this key will display various selectable lighting controls on the right side of the active page.

MAP READING LIGHTS

Map reading lights are located on the left and right cockpit sidewalls above the circuit breaker panels. Each lamp is mounted on a flexible conduit and is controlled by a rheostat switch located on the base of the assembly. The lights operate on 28 VDC supplied through the 5-amp L and R INSTR LTS circuit breakers on the pilot's and copilot's circuit breaker panels.

LIGHTED CHART HOLDERS

Optional lighted chart holders are available for each control wheel. Lighting is controlled by a control knob located on each chart holder. When the control knob is rotated fully counterclockwise the light is off. Rotating the knob clockwise will cause the light to come on and brighten as the knob is rotated. Chart holder lighting is powered by 28 VDC through the CHART HLDRS circuit breaker on the copilot's circuit breaker panel.

DOME LIGHTS

Dome lights are installed in the cockpit overhead panel. These lights may be used to illuminate the entire cockpit area. The lights are controlled by two separate electrical circuits. A rocker switch next to each light has three positions ON-off-REMOTE. If a BATTERY switch is On, setting a Dome Light switch to ON will illuminate the associated dome light. Rotating the associated OVHD dimmer control (pilot's and copilot's switch panel) will vary the brightness of the dome light. The ON position of the Dome Light switch is powered by 28 VDC through the 5-amp R INSTR LTS circuit breaker on the copilot's circuit breaker panel. When a Dome Light switch is placed in the REMOTE position, the associated dome light is illuminated by setting the membrane-type, entry light switch, located near the entry door, to on. The REMOTE position does not require a BATTERY switch to be on. The REMOTE position of the Dome Light switch is powered by 28 VDC supplied through the 5-amp ENTRY LTS circuit breaker on the copilot's circuit breaker panel.

Some aircraft are wired so that the REMOTE function is disabled when the cabin door is closed and latched. This prevents the cockpit dome light from being activated from the cabin during taxi or flight.

PASSENGER COMPARTMENT LIGHTING

The passenger compartment lighting consists of aisle lights, pyramid cabinet lights (optional), passenger reading lights, overhead lights, entry lights, NO SMOKING/FASTEN SEAT BELTS signs, lavatory lights, cabin baggage compartment lights, and the cove cabinet lights.

AISLE LIGHTS

Aisle lights are installed on each side of the center aisle to provide foot path lighting. Optional aisle proximity lights are available which consists of a series of lights installed in the carpet on each side of the center aisle. The lights are controlled through the membrane-type, aisle light switch located near the entry door. The lights operate on 28 VDC supplied through the 7.5-amp AISLE LTS circuit breaker on the pilot's circuit breaker panel.

PYRAMID CABINET LIGHTS (OPTIONAL)

Some aircraft incorporate lighting to illuminate the aft wall of the cabin. These lights are installed in the top of left and right aft pyramid cabinets. The lights operate on 28 VDC supplied through the 7.5-amp AISLE LTS circuit breaker on the pilot's circuit breaker panel.

The pyramid cabinet lights are controlled as follows:

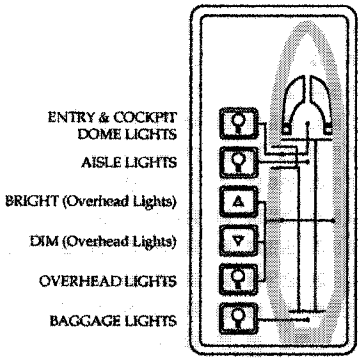
Aircraft without a switch on the pyramid cabinet: When the aisle lights are on, the pyramid cabinet lights will illuminate.

Aircraft with an OFF-ON switch on the pyramid cabinet: When the aisle lights are on and the pyramid cabinet switch is ON, the pyramid cabinet lights will illuminate. Selecting OFF will turn the pyramid cabinet lights off without turning the aisle lights off.

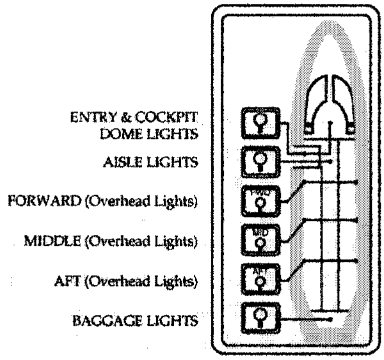
Aircraft with an OFF-REMOTE-ON switch on the pyramid cabinet: When the pyramid cabinet switch is ON, the pyramid cabinet lights will illuminate. Selecting OFF will turn the pyramid cabinet lights off. Selecting REMOTE enables the pyramid cabinet lights to be controlled in unison with the aisle lights via the aisle light switch.

PASSENGER READING LIGHTS

Passenger reading lights are installed in the convenience panels above the seats on each side of the cabin. Some convenience panels consist of an eyeball-type air outlet and a reading light while others consist of a two-light assembly referred to as table lights. Each light includes an integral, directionally-adjustable lens. The lights are controlled through membrane-type switches (READ LIGHTS and TABLE LIGHTS) in the armrest adjacent to each seat location. The lights operate on 28 VDC supplied through the 7.5-amp LH READ LTS and RH READ LTS circuit breakers on the pilot's circuit breaker panel.

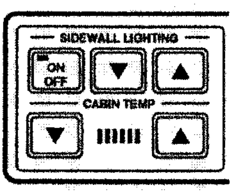


Aircraft without 3-zone Lighting

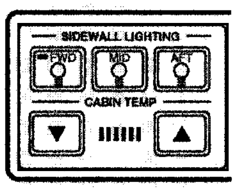


Aircraft with 3-zone Lighting

Located near the entry door

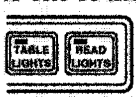


Aircraft without 3-zone Lighting

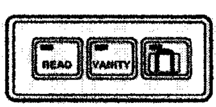


Aircraft with 3-zone Lighting

Cabin Control Switch Panel
(Located adjacent to one of the passenger seats)

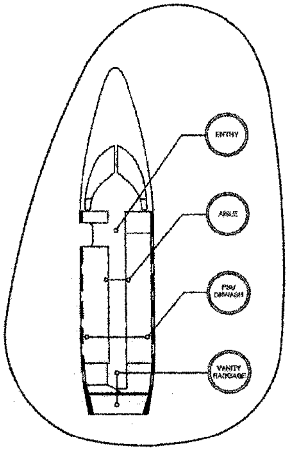


Passenger Switch Panel
(Located in the armrest adjacent to remaining seats)



Located in the lavatory wall

(Aircraft 60-001 thru 60-103)
CABIN LIGHTING CONTROLS
Figure 4-5



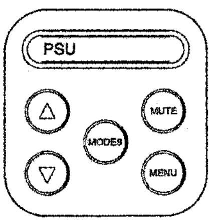
Pressing the ENTRY button will toggle the ON/OFF state of the entryway light.

Pressing the AISLE button will toggle the ON/OFF state of the aisle lights.

Pressing the PSU DNWASH button will alternate the state of the cabin downwash lights. Each press of the downwash button will advance the state of the lights. The lights will work in an Off/Bright/Dim sequence.

Pressing the VANITY/BAGGAGE button will toggle the On/Off state of the baggage light and will place the vanity light in the same state as the baggage light.

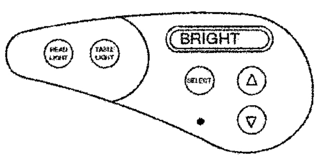
Located near the entry door



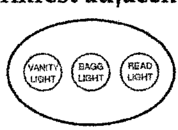
Pressing the MENU button will cause the Master Control Unit to advance through the user menu items.

PSU Downwash Lights — Off/Bright/Dim.
AISLE Lights — On/Off toggle.

Cabin Control Switch Panel
(Located adjacent to one of the passenger seats)



Passenger Control Switch Panel
(Located in the armrest adjacent to remaining seats)



Located in the lavatory wall

(Aircraft 60-104 and Subsequent)
CABIN LIGHTING CONTROLS
Figure 4-5A

OVERHEAD LIGHTS

General cabin lighting is provided by cold-cathode, fluorescent lighting recessed in the cabin convenience panel. The lights are illuminated through seven inverter units which operate on 28 VDC supplied through the 10-amp CABIN LTS circuit breaker on the pilot's circuit breaker panel. On some aircraft, the lights are controlled through three membrane-type switches located near the entry door. One switch provides the on/off function while the other two provide bright and dim functions. On other aircraft, pressing the PSU DNWASH button will alternate the state of the cabin overhead lights. Each press of the button will advance through an Off/Bright/Dim sequence. In the event of cabin depressurization, the lights will automatically illuminate full bright if the cabin altitude reaches approximately 14,500 feet. Refer to OXYGEN SYSTEM for a description of emergency operation of the overhead lights.

On aircraft 60-001 thru 60-103, the optional 3-zone cabin lighting system may be installed. The membrane panel divides the cabin fluorescent lights into three labeled sections of forward, middle, and aft. The forward control panel located near the entry door, and the cabin control unit control the fluorescent lights in each section. By pressing the desired sections overhead light switch once will turn those lights on; press again dims the lights; and pressing a third time turns the lights off.

ENTRY LIGHT

A cabin entry light is installed in an overhead panel just aft of the entry door. The light is controlled through the membrane-type entry light switch located near the entry door. The light's circuits are wired to the right battery bus through the 5-amp ENTRY LTS circuit breaker on the copilot's circuit breaker panel. Therefore, the light is operable regardless of BATTERY switch position. Some aircraft have the optional timer function that turns the cabin entry light off after approximately 60 minutes.

BAGGAGE COMPARTMENT LIGHT

Two overhead lights are installed in the cabin baggage compartment to provide illumination of the compartment. The lights are controlled through the membrane-type baggage light switch located near the entry door or through a membrane-type baggage light switch located in the aft lavatory. The lights' circuits are wired to the right battery bus through the 7.5-amp AFT BAG LT circuit breaker on the copilot's circuit breaker panel. Therefore, the light is operable regardless of BATTERY switch position. Some aircraft have the optional timer function that turns the cabin baggage light off after approximately 60 minutes.

LAVATORY LIGHTS

The lavatory is illuminated by cold-cathode, fluorescent lighting recessed in the lavatory convenience panel, a reading light in the RH overhead convenience panel, a vanity light assembly installed over the vanity cabinet, and vanity mirror lights. The reading and vanity/mirror lights are controlled with a membrane-type switch located on the lavatory wall. In the 3-zone lighting configuration, the cold-cathode fluorescent light is controlled with the vanity lights. The reading light operates on 28 VDC supplied through the 7.5-amp RH READ LTS circuit breaker on the pilot's circuit breaker panel. The vanity lights operate on 28 VDC supplied through the 7.5-amp LAV LTS circuit breaker on the pilot's circuit breaker panel.

NO SMOKING AND FASTEN SEAT BELT SIGNS

No smoking and fasten seat belt signs are installed in the cabin headliner immediately aft of the crew compartment and in the aft cabin. When illuminated, the sign displays symbolic representations for no smoking and fasten seat belts. Illumination of the sign is controlled through the NO SMOKING FASTEN SEAT BELT-OFF-FASTEN SEAT BELT switch on the center switch panel. When the switch is set to NO SMOKING FASTEN SEAT BELT, both symbols will illuminate and a chime will sound. When the switch is set to FASTEN SEAT BELT, only the fasten-seat-belt symbols will illuminate and the tone will sound. Additionally, a RETURN TO SEAT sign is installed in the lavatory. The RETURN TO SEAT sign will be illuminated whenever the fasten seat belt sign is illuminated. Electrical power to illuminate the signs is 28 VDC supplied through the 2-amp PASS INFO circuit breaker on the copilot's circuit breaker panel. The chime is generated by the passenger speaker amplifier and broadcast through the passenger speakers. When the CABIN PWR switch is selected — OFF, the illuminated NO SMOKING/FASTEN SEAT BELT sign is disabled.

Some aircraft have a no smoking cabin. In these aircraft, the no smoking portion of the no smoking and fasten seat belt signs is illuminated anytime one of the BATTERY switches is on. A two-position FASTEN SEAT BELT-OFF switch replaces the three-position NO SMOKING FASTEN SEAT BELT-OFF-FASTEN SEAT BELT switch on the center switch panel.

CARGO AND SERVICING COMPARTMENT LIGHTING

TAILCONE BAGGAGE LIGHTS

Two lights are installed along the LH side of the tailcone baggage compartment to provide illumination of the compartment. On some aircraft, the lights are controlled along with the cabin baggage compartment lights. On other aircraft, a door-actuated switch and BAGGAGE LIGHTS - OFF toggle switch are installed. The toggle and door-activated switches are wired in series to the light assemblies; therefore, the baggage access door must be open and the toggle switch set to BAGGAGE LIGHTS to illuminate the lights. When the toggle switch is set to OFF, the lights will extinguish regardless of the door position. An optional timer may be installed so that the baggage compartment lights will automatically extinguish after approximately 60 minutes. The lights will operate regardless of BATTERY switch position.

TAILCONE MAINTENANCE LIGHT

A tailcone maintenance light is installed in the tailcone equipment compartment to provide illumination of the compartment. The system consists of a light assembly, a MAINT LIGHTS - OFF toggle switch and a door-actuated switch. The toggle switch and door-actuated switch are wired in series to the light assembly; therefore, the tailcone access door must be open and the toggle switch set to the MAINT LIGHTS position to illuminate the light. When the toggle switch is set to OFF, the light will extinguish regardless of the access door position. When the access door is closed, the light will extinguish regardless of the toggle switch position. An optional timer may be installed that will automatically extinguish the tailcone maintenance light after approximately 60 minutes. The maintenance light operates on 28 VDC supplied from the #1 battery through a 5-amp current limiter.

An optional moveable tailcone light may be installed in addition to the tailcone maintenance light described above. It is similar to the stationary tailcone maintenance light in power source and door-switch actuation except the moveable light includes a 5-foot cord and can be removed from its base.

A rheostat knob on the back of the light controls light intensity. Turning the knob fully clockwise activates the floodlight position while turning the knob fully counter-clockwise activates the spot light position. A floodlight override button, located in the center of the rheostat knob, will immediately activate the floodlight without having to turn the knob fully clockwise and will deactivate the rheostat knob.

EMERGENCY LIGHTING SYSTEM (OPTIONAL)

The emergency exit lighting system provides cabin and exit lighting in the event of a normal electrical system failure. The system consists of two emergency battery units, two egress light assemblies (one for each exit), an EMERGENCY EXIT LIGHTS control panel, and associated aircraft wiring. The passenger reading lights and aisle lights are utilized to provide cabin lighting for emergency egress. The batteries are charged through the 5-amp EMER LTS circuit breaker on the copilot's circuit breaker panel. If armed, the system will automatically activate whenever R DC BUS 4 loses normal electrical power. Therefore, the system will automatically activate during EMER BUS mode.

EXIT SIGNS

The aircraft is equipped with emergency exit signs that are self illuminating to show passengers the location of aircraft exits. There is no electrical wiring associated with this type of placard. They use radioactive material to produce the lighting. Also, there is an optional all DC powered exit signs which could be installed.

EMERGENCY BATTERY UNITS

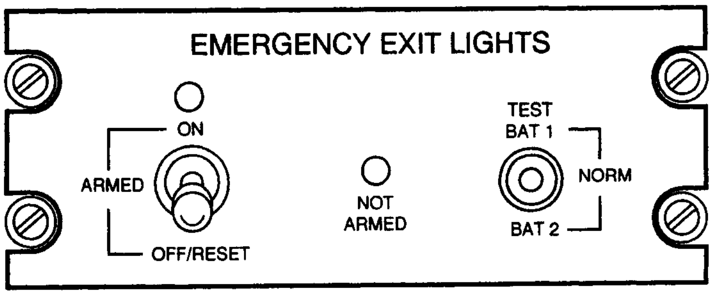
The battery units, used in the emergency exit lighting system, are rechargeable, 24-volt, and maintenance-free. Each battery unit incorporates a relay that when activated will connect the battery to the lights utilized for emergency exit lighting. The relay will remain latched in this position until a signal to reset is received. Therefore, once activated the emergency exit lighting system will remain activated even though control wiring may become severed. One battery is located in the forward part of the cabin while the other is located in the aft part of the cabin. Either battery is capable of powering the entire emergency exit lighting system by itself, thus allowing emergency lighting to activate even with a vertical transverse separation of the cabin.

EGRESS LIGHT ASSEMBLIES

An egress light assembly is installed in the upper cabin door and the emergency escape/baggage door. When activated, these lights provide illumination of the emergency exits. Each light assembly includes a momentary push button switch. If the system is armed but not activated, pressing either push button switch will manually activate the system.

EMERGENCY EXIT LIGHTS CONTROL PANEL

The EMERGENCY EXIT LIGHTS control panel, in the cockpit, provides control, testing, and indicating functions for the emergency exit lighting system. The panel includes: one control switch (ON-ARMED-OFF/RESET), one test switch (TEST BAT 1-NORM-TEST BAT 2), one white ON annunciator, and one amber NOT ARMED annunciator.



EMERGENCY EXIT LIGHTS CONTROL PANEL
Figure 4-6

CONTROL SWITCH

Functions of the control switch are shown in the following table:

Switch Position	System Response
OFF/RESET	The relays in both battery units will reset to off and all emergency exit lighting will go out. Pressing one of the pushbutton switches at either exit will activate the system while held. Upon release, the system will reset to off.
ARMED	Arms the system to automatically activate should normal electrical power be lost. Selecting ARMED prior to powering up the aircraft will cause the system to activate immediately. Pressing one of the pushbutton switches at either exit will manually activate the system.
ON	To manually activate the system, hold switch momentarily to ON and release. The switch will spring back to the ARMED position and the system will remain activated.

TEST SWITCH

The test switch is a three-position switch spring loaded to the NORM position. The test switch is used to verify each battery unit is capable of powering all the emergency exit lighting by itself.

To test system:

1. Aircraft BATTERY Switches — On.
2. EMERGENCY EXIT LIGHTS Switch — ARMED.
3. TEST Switch — BAT 1 and hold. Reading lights, aisle lights, and egress lights will illuminate. ON annunciator will also illuminate.
4. TEST Switch — BAT 2 and hold. Reading lights, aisle lights, and egress lights will illuminate. ON annunciator will also illuminate.
5. TEST Switch — Release to NORM. Emergency exit lighting will reset to off and the ON annunciator will extinguish.

ANNUNCIATORS

Meaning of the ON and NOT ARMED lights is shown in the following table:

Annunciation	Means
ON	The system is activated either manually or automatically. Also annunciates during test.
NOT ARMED	The aircraft is powered up and the system is not yet armed. Also annunciates whenever the system has been automatically activated. Illumination of NOT ARMED will trip the Master CAUT lights.

MASTER CAUTION/WARNING AND ANNUNCIATOR PANEL LIGHTS

Master WARN/CAUT lights on the pilot's and copilot's instrument panels and annunciator panel cockpit warning lights give a visual indication of various systems operating conditions. The annunciator panel lights are white (advisory), green (normal), amber (caution) and red (warning).

The annunciator panel cockpit warning lights may be tested by pressing the test switch on either side of the panel. During the first 3 seconds of the lamp test, the two bulbs in each light will alternately illuminate. Thereafter, all the bulbs will illuminate until the test switch is released. Photoelectric cells, outboard of each ENG FIRE PULL Switch, automatically dim the annunciator panel lights to a level corresponding to existing light in the cockpit or to a minimum preset level for a totally dark cockpit. Other cockpit annunciator lights are dimmed when the NAV lights are on.

If an annunciator light illuminates and the condition is corrected, the light will extinguish. If the condition recurs, the light will again illuminate.

Illumination of any red cockpit annunciator will cause both Master WARN lights to illuminate and flash. Depressing the Master WARN/ CAUT light will extinguish the Master WARN light even though the annunciator light may be flashing (ENTRY DOOR, AFT CAB DOOR, L or R STALL, CABIN FIRE, or either ENG FIRE PULL).

Illumination of any amber cockpit annunciator, except starter engaged lights (during ground operations), will cause both Master CAUT lights to illuminate and flash unless the master caution feature has been inhibited. Depressing the Master WARN/CAUT light will extinguish the Master CAUT light even though the annunciator light may be illuminated. The annunciator light will remain on as long as the condition exists. When the aircraft is on the ground, the master caution feature may be inhibited by depressing and holding either Master WARN/CAUT light until the Master CAUT light illuminates steadily. Approximately 10 seconds after takeoff, the master caution feature will revert to the normal (uninhibited) mode.

Most white annunciators may be extinguished in flight by depressing either Master WARN/CAUT light. Depressing either warning lights Test switch will cause the annunciators to illuminate again. A white ENG CMPTR light accompanied by an amber ENG CMPTR light may not be extinguished. Any white annunciators which were extinguished in flight will again illuminate shortly after touchdown.

SECTION V
FLIGHT SYSTEMS & AVIONICS

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SECTION V
FLIGHT SYSTEMS & AVIONICS

FLIGHT CONTROLS

The primary flight controls (ailerons, elevator, and rudder) are mechanically operated through the control columns, control wheels, and rudder pedals. The flaps and spoilers are hydraulically operated and electrically controlled. Aircraft trim systems (pitch, roll, and yaw) are electrically operated and controlled.

AILERON AND ELEVATOR

Movement of the control columns and control wheels is mechanically translated into elevator and aileron control surface movement through systems of cables, pulleys, and push-pull rods. In addition to aileron control, the control wheels incorporate switches that control normal trim, pitch-axis interrupt, autopilot and yaw damper disconnect, flight director clear, flight director sync, microphone keying, and nose wheel steering engage and disengage circuits. Control wheel switch functions are discussed under the applicable system.

RUDDER

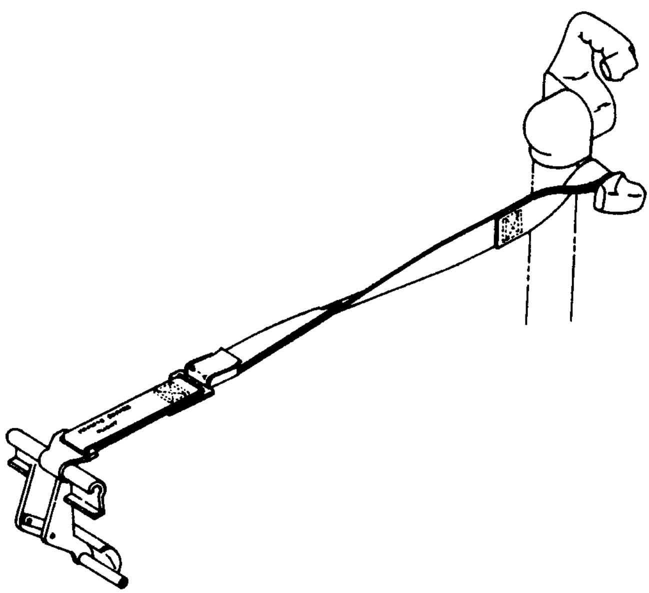
Rudder pedal movement is mechanically translated into rudder control surface movement through a system of cables, pulleys, and bellcranks. Nose wheel steering, when engaged, is electronically controlled by the pedals and braking may be accomplished by depressing the upper portion of the pedals.

PEDAL ADJUST SWITCHES

The pilot's and copilot's rudder pedals are individually adjustable through the PEDAL ADJUST switches on the pilot's and copilot's outboard switch panels. Each switch has three positions: FWD, OFF, and AFT. When either switch is held to the FWD or AFT position, an electrically controlled actuator will move the corresponding rudder pedals in the desired direction. The rudder pedal adjust system operates on 28 VDC supplied through the 5-amp RUDDER PEDAL ADJUST circuit breaker on the copilot's circuit breaker panel.

CONTROLS GUST LOCK

A controls gust lock is provided to help prevent wind gust damage to the movable control surfaces. When installed, the lock provides security by holding full rudder, full aileron, and full down elevator.



CONTROLS GUST LOCK
Figure 5-1

FLAPS

The hydraulically-actuated, electrically-controlled flap system provides flap settings of UP (0°), 8°, 20°, and DN (40°). The single-slotted flaps are attached to the rear wing spar with tracks, rollers, and hinges. The flap selector switch controls a solenoid-operated hydraulic control valve that meters hydraulic pressure to the flap actuators. The actuators mechanically rotate sectors attached to the flaps through adjustable push-pull tubes. Interconnecting cables and pulleys synchronize flap movement throughout the range of travel. A flap position switch is mechanically connected to each flap sector. These switches provide flap position information to the landing gear warning, stall warning, spoiler warning, trim-in-motion warning, spoileron, and autopilot systems. A flap limit switch is mechanically connected to each sector to automatically maintain flap position at the selected setting. Overtravel, when the flaps are fully extended, is mechanically prevented. The flap control system operates on 28 VDC supplied through the 3-amp FLAPS circuit breaker on the copilot's circuit breaker panel. The flaps are operative during the EMER BUS mode.

FLAP SELECTOR SWITCH

The flap selector switch is located on the right side of the pedestal near the thrust levers. The switch has four positions: UP, 8, 20, and DN. The switch handle is shaped like an airfoil. When 8° or 20° flaps is selected, 28 VDC is directed to the applicable (up or down) solenoid of the flap control valve. The flap control valve will meter hydraulic pressure to the flap actuators and move the flaps in the desired direction. As the flaps approach within 1° of the selected setting, the applicable flap limit switch will remove power from the flap control valve solenoid and flap travel will stop. When UP is selected, 28 VDC is directed to the up solenoid of the flap control valve and the flaps will move in the up direction. When DN is selected, 28 VDC is directed to the down solenoid of the flap control valve and the flaps will move in the down direction. When the flaps reach full extension, the "down" pressure will remain to maintain the flaps full down.

FLAP POSITION INDICATOR

The vertical-scale FLAP position indicator, mounted in the center instrument panel, provides the crew with visual indication of flap position. The indicator face consists of a scale, which has markings for UP (0°), 8°, 20°, and DN (40°), and a pointer on the right margin of the scale. A potentiometer connected to the left flap sector transmits the flap position signal to the indicator. The indicator operates on 28 VDC supplied through the 2-amp TRIM-FLAP-SPOILER INDICATOR circuit breaker on the copilot's circuit breaker panel. The flap position indicator is operative during the EMER BUS mode.

SPOILERS

The spoilers, located on the upper surface of the wings forward of the flaps, may be extended symmetrically for use as spoilers or asymmetrically for aileron augmentation when the flaps are extended. The spoilers are electrically controlled and hydraulically actuated either by a control switch (Normal Spoiler Mode), by the wing flap position switches (Spoileron), or automatically during ground operations when the thrust levers are pulled to idle (Autospoilers).

Autospoilers: *On aircraft 60-001 thru 60-078 & 60-080 thru 60-093 not modified by SB 60-27-6 (Autospoiler Wheel Speed Detection System),* the autospoiler mode is used to automatically extend the spoilers on landing or in the event of an aborted takeoff. When the SPOILER lever is set to ARM, the system will be armed (SPOILER ARM light will illuminate) to automatically extend both spoilers when both squat switch circuits indicate an "on ground" condition and both thrust levers are in the IDLE position. The squat switch circuits are electronically latched in the "on ground" state once the initial weight-on-wheels signal is received. This prevents inadvertent spoiler retraction in the event the aircraft should bounce during the ground roll. If either thrust lever is moved above IDLE while autospoilers are extended, the spoilers will immediately retract. Flap position has no effect on autospoiler operation and autospoilers are not operational when EXT or RET is selected. Autospoiler control circuits operate on 28 VDC supplied through the 3-amp SPOILER circuit breaker on the copilot's circuit breaker panel. Autospoilers are operative during the EMER BUS mode.

On aircraft 60-079, & 60-094 and subsequent and prior aircraft modified by SB 60-27-6, the autospoiler mode is used to automatically extend the spoilers on landing or in the event of an aborted takeoff. When the SPOILER lever is set to ARM, the system will be armed (SPOILER ARM light will illuminate) to automatically extend both spoilers when one of the following conditions are met.

Flight Phase	Autospoilers will deploy when:
Aborted Takeoff	Aircraft accelerates to 40 knots or greater groundspeed and the thrust levers are brought to IDLE per the ABORTED TAKEOFF procedure. Spoilers will remain deployed unless a thrust lever is advanced above IDLE.
Landing	Either of the following occurs: 1. Both squat switches indicate an "on ground" condition and both thrust levers are in IDLE (one may be in CUTOFF) or 2. A wheel speed of 40 knots or greater is attained at touchdown and both thrust levers are in IDLE (one may be in CUTOFF). Spoilers will remain deployed unless a thrust lever is advanced above IDLE.

Once spoilers are deployed, the deploy signal will latch and cycling the squat switches will not stow the spoilers. Advancing one or both throttles will release the latch and stow the spoilers. Normal spoiler extension and retraction will override the autospoiler logic. Flap position has no effect on autospoiler operation and autospoilers are not operational when EXT or RET is selected. Autospoiler control circuits operate on 28 VDC supplied through the 3-amp SPOILER circuit breaker on the copilot's circuit breaker panel. Autospoilers are operative during the EMER BUS mode.

Normal Spoiler Mode: During the spoiler mode, the spoilers are symmetrically extended and retracted through the SPOILER lever on the forward pedestal. In flight, the spoilers may be extended to any desired position by placing the SPOILER lever in any position between ARM and EXT. Detents for approximately 10° and 20° positions are provided between the ARM and EXT positions of the lever. On the ground, the spoilers will extend fully whenever any partial extension is selected. Spoiler position is indicated by the spoiler position indicator adjacent to the flap position indicator on the center instrument panel. The spoiler mode, when selected, will override the aileron augmentation (spoileron) mode, if aileron augmentation is engaged. When the spoiler lever is positioned for spoiler extension, a computer-amplifier will command a selector valve and two servo valves to the extend position.

These valves will apply hydraulic pressure to the spoiler actuators and cause the spoilers to extend. As the spoilers unseat and extend through 1°, the SPOILER EXT light will illuminate and the computer will close a restrictor bypass to restrict hydraulic flow into the return line. The spoilers will fully extend in approximately 5 to 7 seconds. Full extension is approximately 45°. However, during flight, a pressure relief allows the spoilers to "blow down" to a lesser extension angle. When RET is selected, the computer-amplifier will command the servo valves closed and the selector valve to retract. The selector valve will then apply hydraulic pressure to the spoiler actuators and cause the spoilers to retract. When retracted, the spoilers are secured by an internal locking mechanism in the actuators. The spoilers will fully retract in approximately 4 seconds. A monitor circuit will automatically retract both spoilers and illuminate the SPOILER MON light should a malfunction occur. Spoiler mode control circuits operate on 28 VDC supplied through the 3-amp SPOILER circuit breaker on the copilot's circuit breaker panel. The spoilers are operative during EMER BUS mode.

Spoileron Mode: During the spoileron (aileron augmentation) mode, the spoilers are independently raised and lowered in a one-to-one ratio with the upgoing aileron to improve lateral control with the flaps full down. Aileron augmentation is automatically engaged when the flaps are lowered beyond 25° and the SPOILER lever is in the RET or ARM position. During the spoileron mode, the computer-amplifier continuously monitors aileron position through follow-ups on the aileron sectors. As the ailerons move, the computer-amplifier actuates the spoiler selector and servo valves to control spoiler movement. As one aileron moves up, the servo valves are positioned so that the spoiler on the same wing moves up with the aileron while the opposite spoiler remains retracted. A limit switch for each spoiler limits spoiler extension to approximately 15°. A monitor circuit will automatically retract both spoilers and illuminate the SPOILER MON light should a malfunction occur. The spoileron mode operates on 115 VAC supplied through the 1-amp SPOILERON circuit breaker on the copilot's circuit breaker panel.

SPOILER LEVER

Symmetric extension and retraction of the spoilers is controlled through the SPOILER lever located on the left side of the pedestal adjacent to the thrust levers. The lever has five positions: RET, ARM, two partial extension detents and EXT. When the switch is set to EXT, both spoilers will extend and the SPOILER EXT light will illuminate. When the lever is set to ARM, the autospoiler system will be armed for automatic spoiler extension and the SPOILER ARM light will illuminate.

When the lever is set to RET, both spoilers will retract. The spoilers may be extended partially by placing the spoiler lever between ARM and EXT. When on the ground, the spoilers will extend fully when the spoiler lever is in any position between ARM and EXT.

SPOILER EXT LIGHT

The SPOILER EXT light, located on the glareshield annunciator panel, will illuminate steady whenever the flaps are UP and the spoilers are extended. The light will flash if the spoilers are extended and the flaps are beyond 3°. The light is operated by a 1°-up position switch for each spoiler. The light will illuminate if either 1°-up switch is actuated except during spoileron mode.

SPOILER ARM LIGHT

The SPOILER ARM light, on the glareshield annunciator panel, will illuminate whenever the autospoiler mode is armed and remains illuminated when autospoilers are extended. The light will not illuminate and the autospoiler system will not arm (SPOILER ARM light will not come on), or will disarm (SPOILER ARM light will go out), if the squat switches are in an asymmetric condition for more than approximately 2 minutes.

SPOILER MON LIGHT

The amber SPOILER MON light, located on the glareshield annunciator panel, will illuminate whenever monitor circuits in the computer-amplifier detect a malfunction during the spoileron mode or unequal spoiler extension during the spoiler mode. Should the monitor detect a malfunction during aileron augmentation, the monitor will automatically disengage the spoileron mode and the spoilers will immediately retract. If the monitor has disabled aileron augmentation or the SPOILERON circuit breaker is pulled, normal spoiler mode operation will not be available in flight; however, the spoilers will be available for ground operation. The autospoilers will also be operational but should not be armed if the SPOILERON circuit breaker is open. During the spoiler mode, the SPOILER MON light will illuminate and both spoilers will retract in the event of unequal spoiler extension where the difference is 6° or more. Additionally, the SPOILER MON light will also illuminate if either of the autospoiler dual logic circuits fail.

SYSTEM TEST SWITCH — SPOILER RESET FUNCTION

The rotary-type system test switch, located on the center instrument panel, is used to test the spoiler system.

During flight, the SPOILER RESET position is used to reset the spoiler/spoileron system in the event of a malfunction. Should the monitor disable spoiler/spoileron mode (SPOILER MON light illuminated) and the fault clears, the system may be enabled by momentarily placing the system test switch in the SPOILER RESET position. If the system is reset, the SPOILER MON light will extinguish. If the spoiler/spoileron system cannot be reset, the SPOILER MON light will remain illuminated and normal spoiler or spoilerons will not be available in flight.

During ground operations, the switch is used during the spoileron and autospoiler test sequence to verify system operation. Placing the system test switch in the SPOILER RESET position and depressing the PRESS TEST button in the center of the switch will simulate a malfunction.

TRIM SYSTEMS

MACH TRIM

The Mach trim system provides automatic pitch trim in response to Mach changes to increase longitudinal stability and counteract the center-of-lift movement at speeds above approximately 0.70 MI if the autopilot is disengaged or inoperative. The system consists of a computer, a pitch trim followup, the MACH TRIM annunciator light, and associated aircraft wiring. The Mach trim computer receives Mach data from the air data computers. The Mach trim system utilizes the primary motor of the horizontal-stabilizer pitch-trim actuator to affect trim changes. The Mach trim computer operates on 115 VAC supplied through the 1-amp MACH TRIM circuit breaker and 28 VDC supplied through the 3-amp PRI PITCH TRIM circuit breaker on the pilot's circuit breaker panel. The Mach trim system is inoperative during EMER BUS mode.

During flight, with the autopilot disengaged or inoperative, the Mach trim system will automatically engage at approximately 0.70 MI. As the aircraft Mach number changes, the change is sensed by the air data computers and transmitted to the Mach trim computer. If the aircraft is not retrimmed to compensate for the Mach change, the Mach trim computer will command the appropriate pitch trim change (nose up for increased Mach and nose down for decreased Mach) through the horizontal-stabilizer pitch-trim actuator. A followup on the horizontal stabilizer will transmit a horizontal stabilizer position signal to the

Mach trim computer. Stabilizer trim motion will cease as the followup stabilizer position signal cancels the pitch trim signal from the Mach trim computer. Monitors are installed to disengage Mach trim in the event of a malfunction. If a monitor disengages Mach trim and Mach is above 0.77 MI, the overspeed warning horn will sound. The Mach trim system is resynchronized whenever either pilot manually trims the aircraft and a synchronous standby mode is maintained if the autopilot is engaged. In flight, Mach trim monitor may also be reset through the SYSTEM TEST switch on the center instrument panel.

PITCH TRIM SELECTOR SWITCH-MACH TRIM FUNCTION

The Mach trim system utilizes the primary motor of the horizontal stabilizer pitch trim actuator to increase longitudinal stability. If the PITCH TRIM selector switch on the pedestal is in the PRI position, Mach trim will automatically engage at approximately 0.70 MI if the autopilot is disengaged or inoperative. Mach trim will not engage or will disengage when the PITCH TRIM selector switch is moved to the OFF or SEC position. If the PITCH TRIM selector switch is in OFF or SEC, the Mach trim monitor will remain active and will illuminate the MACH TRIM light and cause the overspeed warning horn to sound at or above 0.77 MI if the monitor detects a sufficient Mach/horizontal stabilizer position error.

MACH TRIM LIGHT

The amber MACH TRIM annunciator light, located on the glareshield annunciator panel, will illuminate whenever the Mach trim monitor or Mach monitor has disengaged the Mach trim system. Whenever the Mach trim system is disengaged and Mach is above 0.77 MI, the overspeed warning horn will sound if the autopilot is inoperative or not engaged. The Mach trim monitor continuously monitors input signals and power to the Mach trim computer. In the event of loss of power to the Mach trim computer or primary pitch trim system, loss of input signals to the Mach trim computer, or a Mach/horizontal stabilizer position error, the Mach trim monitor will disengage Mach trim and illuminate the MACH TRIM light.

SYSTEM TEST SWITCH-MACH TRIM FUNCTION

The rotary-type SYSTEM TEST switch on the center instrument panel is used to test the Mach trim system and the Mach trim monitor while the aircraft is on the ground. In flight, the switch is used to resynchronize the system if the Mach trim monitor has disengaged the system. The test function is initiated by rotating the switch to MACH TRIM and then depressing the switch PRESS TEST button. When the aircraft is on the ground and the test sequence is initiated, the test switch inserts a signal that causes the horizontal stabilizer to trim in the nose-up direction. Since there is no corresponding airspeed change, the Mach trim monitor senses a Mach/horizontal stabilizer position error, disengages Mach trim, and illuminates the MACH TRIM light. In flight, depressing the PRESS TEST button will resynchronize the Mach trim system to the horizontal stabilizer position and Mach existing when the PRESS TEST button was depressed.

PITCH TRIM

Pitch trim is accomplished by repositioning the horizontal stabilizer to the desired trim setting through actuation of the horizontal stabilizer pitch trim actuator. The actuator is a dual-motor, screwjack-type actuator. The primary motor is operated by the aircraft primary pitch trim system and the Mach trim system. The secondary motor is operated by the aircraft secondary pitch trim system and the autopilot. A speed controller in the primary pitch trim system changes primary pitch trim rate as a function of horizontal stabilizer trim position. The speed controller allows high trim rates when the aircraft is trimmed for takeoff or approach and low trim rates when the aircraft is trimmed for cruise. A trim speed monitor is incorporated into the speed controller to alert the crew of a trim speed error. The primary and secondary pitch trim systems are electrically independent and mode selection is made through a selector switch. Primary pitch trim is pilot controlled through trim switches on each control wheel. Secondary pitch trim is pilot controlled through a switch on the pedestal. Emergency interrupt is provided for both systems through the Control Wheel Master switches (MSW). Horizontal stabilizer trim position is displayed on an indicator mounted in the center instrument panel below the landing gear lever. Primary pitch trim control circuits operate on 28 VDC supplied through the 3-amp PRI PITCH TRIM circuit breaker on the pilot's circuit breaker panel. Secondary pitch trim control circuits operate on 28 VDC supplied through the 10-amp SEC PITCH TRIM circuit breaker on the copilot's circuit breaker panel. Both the primary and secondary pitch trim systems are operative during EMER BUS mode.

PITCH TRIM SELECTOR SWITCH

The PITCH TRIM selector switch, located on the pedestal trim control panel, provides primary and secondary mode selection for the aircraft trim systems. The switch has three positions: PRI, OFF, and SEC. When the switch is set to PRI, a ground path is provided for the primary pitch trim system control circuits and trim changes are accomplished through the control wheel trim switches. When the switch is set to SEC, a ground path is provided for the secondary pitch trim system control circuits and trim changes are accomplished through the pedestal NOSE DN-OFF-NOSE UP switch. When the switch is set to the OFF position, both pitch trim electrical control circuits are isolated from the aircraft electrical system. The Mach trim system is inoperative with the PITCH TRIM selector switch in the OFF or SEC positions. The autopilot is inoperative with the PITCH TRIM selector switch in the OFF position.

CONTROL WHEEL TRIM SWITCHES-PITCH FUNCTION

Each control wheel trim switch is a dual-function (trim and trim arming) switch which controls primary pitch trim and roll trim. One switch is located on the outboard horn of each control wheel. Each switch has four positions: LWD, RWD, NOSE UP, and NOSE DN. The trim arming button on top of the switch must be depressed for trim motion to occur. With the PITCH TRIM selector switch in the PRI position, actuation of either switch to NOSE UP or NOSE DN will signal the primary motor in the horizontal stabilizer pitch trim actuator to move the stabilizer in the appropriate direction. Actuation of the pilot's switch will override actuation of the copilot's switch. Actuation of either switch to any of the four positions (LWD, RWD, NOSE UP, or NOSE DN) will disengage the autopilot. Actuation of either switch to NOSE UP or NOSE DN will resynchronize the Mach trim computer.

PEDESTAL NOSE DN-OFF-NOSE UP SWITCH

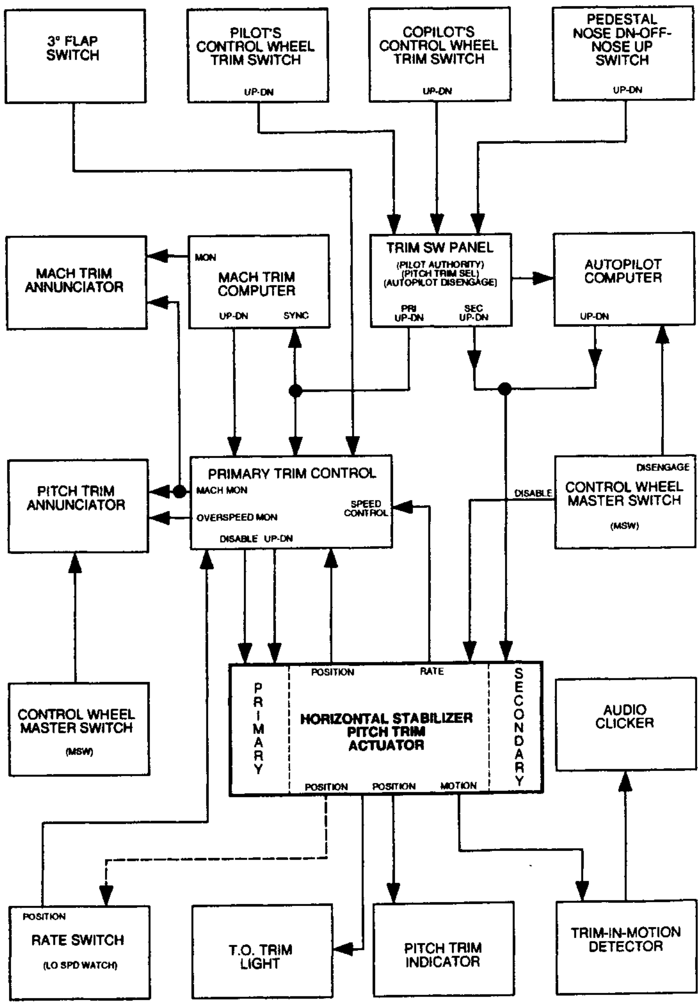
The NOSE DN-OFF-NOSE UP switch, located on the pedestal trim control panel, controls secondary pitch trim. The switch is spring loaded to the center (OFF) position. With the PITCH TRIM selector switch in the SEC position, actuation of the NOSE DN-OFF-NOSE UP switch to NOSE DN or NOSE UP will signal the secondary motor of the horizontal stabilizer pitch trim actuator to move the stabilizer in the appropriate direction. Actuation of secondary pitch trim will disengage the autopilot. The Mach trim system is inoperative when using secondary pitch trim. With the PITCH TRIM selector switch in the PRI or OFF position, this switch has no effect.

CONTROL WHEEL MASTER SWITCHES-PITCH TRIM FUNCTION

A Control Wheel Master Switch (MSW) is located beneath the control wheel trim switch on the outboard horn of each control wheel. In addition to the switches' other functions, either Control Wheel Master Switch (MSW), when depressed, will inhibit primary or secondary pitch trim. If the Control Wheel Master Switch is used to inhibit primary pitch trim, primary pitch trim cannot be reactivated until the Control Wheel Master Switch is released and the trim input is removed. Therefore, during the preflight check of the primary pitch trim system, it is necessary to release the control wheel trim switch as well as the Control Wheel Master Switch (MSW) to reset the system. Secondary pitch trim, however, will be inhibited only as long as the Control Wheel Master Switch (MSW) is held.

PITCH TRIM LIGHT

An amber PITCH TRIM annunciator light, located on the glareshield annunciator panel, is installed to alert the crew of primary pitch trim system malfunctions during flight. Additionally, the PITCH TRIM light will illuminate whenever either Control Wheel Master Switch (MSW) is depressed.



PITCH TRIM SYSTEM BLOCK DIAGRAM
Figure 5-2

T. O. TRIM LIGHT

An amber T. O. TRIM annunciator light, located on the glareshield annunciator panel, is installed to alert the crew that the PITCH TRIM indicator pointer is not within the T. O. segment when the aircraft is on the ground. The light will be extinguished whenever the indicator pointer is set within the T. O. segment. The light is disabled during flight operations.

SYSTEM TEST SWITCH-TRIM OVERSPEED FUNCTION

The rotary-type SYSTEM TEST switch, located on the pilot's instrument panel, is used to test the trim speed monitor. Prior to beginning the trim speed monitor test, the pitch trim must be set on the high trim rate (N UP) side of the index (►) on the PITCH TRIM indicator. The monitor test is initiated by rotating the SYSTEM TEST switch to TRIM OVSP, initiating primary pitch trim through either control wheel trim switch, and then depressing the switch PRESS TEST button. When the PRESS TEST button is depressed, a false low trim rate range horizontal stabilizer position signal is applied to the trim speed monitor. With the trim speed monitor in the low trim rate watch mode, running the primary pitch trim at the high trim rate will cause the trim speed monitor to illuminate the PITCH TRIM light.

PITCH TRIM INDICATOR

Horizontal stabilizer trim position indication is provided by the PITCH TRIM indicator located in the trim indicator panel on the center instrument panel. The indicator face has markings for 1° to 12° of horizontal stabilizer travel; however, only the T.O. range markings are labeled. N DN and N UP markings indicate the direction of trim travel for airplane nose down and airplane nose up respectively. The T.O. (takeoff) segment is marked from 5.7° to 8.75°. The margins of the T.O. segment are marked AFT and FWD, representing the trim limits for the center-of-gravity extremes. An index mark at the 6.5° position, separates the high and low trim rate ranges. At pitch trim settings on the N UP side of the index, the trim speed controller will be in the high trim rate (low airspeed) mode. At pitch trim settings on the N DN side of the index, the trim speed controller will be in the low trim rate (high airspeed) mode. The indicator receives horizontal stabilizer position inputs from a potentiometer installed in the horizontal stabilizer pitch trim actuator. The indicator operates on 28 VDC supplied through the 2-amp TRIM-FLAP-SPOILER INDICATOR circuit breaker on the copilot's circuit breaker panel. The pitch trim indicator is operative during EMER BUS mode.

TRIM-IN-MOTION AUDIO CLICKER

A trim-in-motion audio clicker system is installed to alert the crew of horizontal stabilizer movement. The system will annunciate continuous movement of the horizontal stabilizer by producing a series of audible clicks through the headsets and cockpit speakers. The system consists of a potentiometer in the horizontal stabilizer pitch trim actuator, a trim-in-motion detector box and associated aircraft wiring. As the horizontal stabilizer actuator drives the stabilizer, the output signal from the potentiometer is altered. The change in potentiometer signal is sensed by the detector box. After approximately 1/4 second of continuous stabilizer movement, the detector box will produce the speaker and headset clicks. The trim-in-motion audio clicker system is wired through the flap position switches and will not sound if the flaps are lowered beyond 3°. The trim-in-motion audible clicker may or may not sound during autopilot trim due to the duration of the trim inputs. Power for system operation is 28 VDC supplied from the 7.5-amp WARN LTS circuit breakers on the pilot's and copilot's circuit breaker panels through the warning lights control box. These circuit breakers are powered during EMER BUS mode.

ROLL TRIM

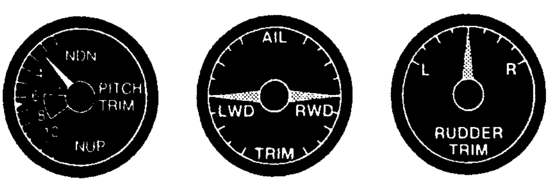
Roll trim is accomplished by positioning the aileron trim tab on the inboard trailing edge of the left aileron through actuation of the roll trim actuator. The roll trim actuator is an electrically-operated, rotary-type actuator connected to the aileron trim tab by a push-pull rod. The system is controlled through the pilot's and copilot's control wheel trim switches. Trim tab position information is displayed on an indicator mounted on the center instrument panel. The roll trim system operates on 28 VDC supplied through the 7.5-amp ROLL TRIM circuit breaker on the pilot's circuit breaker panel.

CONTROL WHEEL TRIM SWITCHES-ROLL FUNCTION

Each control wheel trim switch is a dual-function (trim and trim arming) switch which controls roll trim and primary pitch trim. One switch is located on the outboard horn of each control wheel. Each switch has four positions: LWD, RWD, NOSE UP, and NOSE DN. The arming button on top of the switch must be depressed for trim motion to occur. Actuation of either control wheel trim switch to LWD or RWD will signal the aileron trim tab actuator to move the tab as required to lower the appropriate wing. Actuation of the pilot's switch will override actuation of the copilot's switch. Actuation of either switch to any of the four positions (LWD, RWD, NOSE-UP, or NOSE-DN) will disengage the autopilot if the trim arming button is depressed.

CONTROL WHEEL MASTER SWITCHES - ROLL TRIM

A Control Wheel Master Switch (MSW) is located beneath the control wheel trim switch on the outboard horn of each control wheel. In addition to the switches' other functions, either Control Wheel Master Switch (MSW), when depressed, will inhibit roll trim. The roll trim is inhibited only as long as the Control Wheel Master Switch (MSW) is held.



TRIM INDICATORS
Figure 5-3

AILERON TRIM INDICATOR

Aileron trim tab position indication is provided by the AIL TRIM indicator located on the center instrument panel. Two semi-circular scales and pointers present the trim tab position in terms of LWD (left wing down) and RWD (right wing down). The scale markings represent increments of trim tab travel. The indicator receives aileron trim tab position inputs from a potentiometer in the roll trim actuator. The indicator operates on 28 VDC supplied through the 2-amp TRIM-FLAP-SPOILER INDICATOR circuit breaker on the copilot's circuit breaker panel. The AIL TRIM indicator will be operative during EMER BUS mode.

YAW TRIM

Yaw trim is accomplished by positioning the rudder trim tab on the lower trailing edge of the rudder through actuation of the yaw trim actuator. The yaw trim actuator is an electrically-operated, rotary-type actuator connected to the rudder trim tab by two push-pull rods. Yaw trim is pilot controlled through the RUDDER TRIM switch on the pedestal. Trim tab position information is provided by the RUDDER TRIM indicator on the center instrument panel. The yaw trim system operates on 28 VDC supplied through the 7.5-amp YAW TRIM circuit breaker on the pilot's circuit breaker panel.

RUDDER TRIM SWITCH

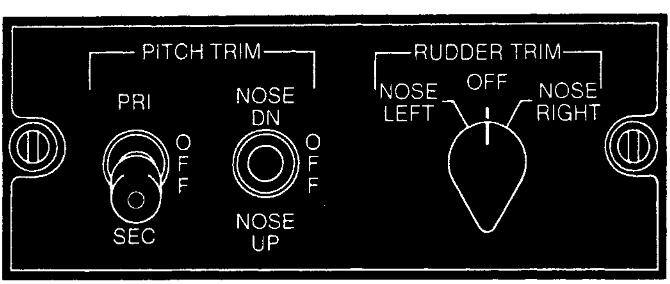
Yaw trim is pilot controlled through the RUDDER TRIM switch located on the pedestal trim control panel. The switch has three positions: NOSE LEFT, OFF, and NOSE RIGHT. The switch knob is split and both halves must be rotated simultaneously to initiate yaw trim motion. When the switch is released, both halves will return to the center OFF position. Actuation of the RUDDER TRIM switch to NOSE LEFT or NOSE RIGHT will signal the yaw trim actuator to move the rudder trim tab in the appropriate direction.

RUDDER TRIM INDICATOR

Rudder trim tab position indication is provided by the RUDDER TRIM indicator located on the center instrument panel. A semicircular scale and pointer indicates the direction (L or R) of yaw trim. The scale markings represent increments of rudder trim tab travel. The indicator receives rudder trim tab position inputs from a potentiometer in the rudder trim actuator. The indicator operates on 28 VDC supplied through the 2-amp TRIM-FLAP-SPOILER INDICATOR circuit breaker on the copilot's circuit breaker panel. The RUDDER TRIM indicator will be operative during the EMER BUS mode.

CONTROL WHEEL MASTER SWITCHES - YAW TRIM

A Control Wheel Master Switch (MSW) is located beneath the control wheel trim switch on the outboard horn of each control wheel. In addition to the switches' other functions, either Control Wheel Master Switch (MSW), when depressed, will inhibit yaw trim. The yaw trim is inhibited only as long as the Control Wheel Master Switch (MSW) is held.



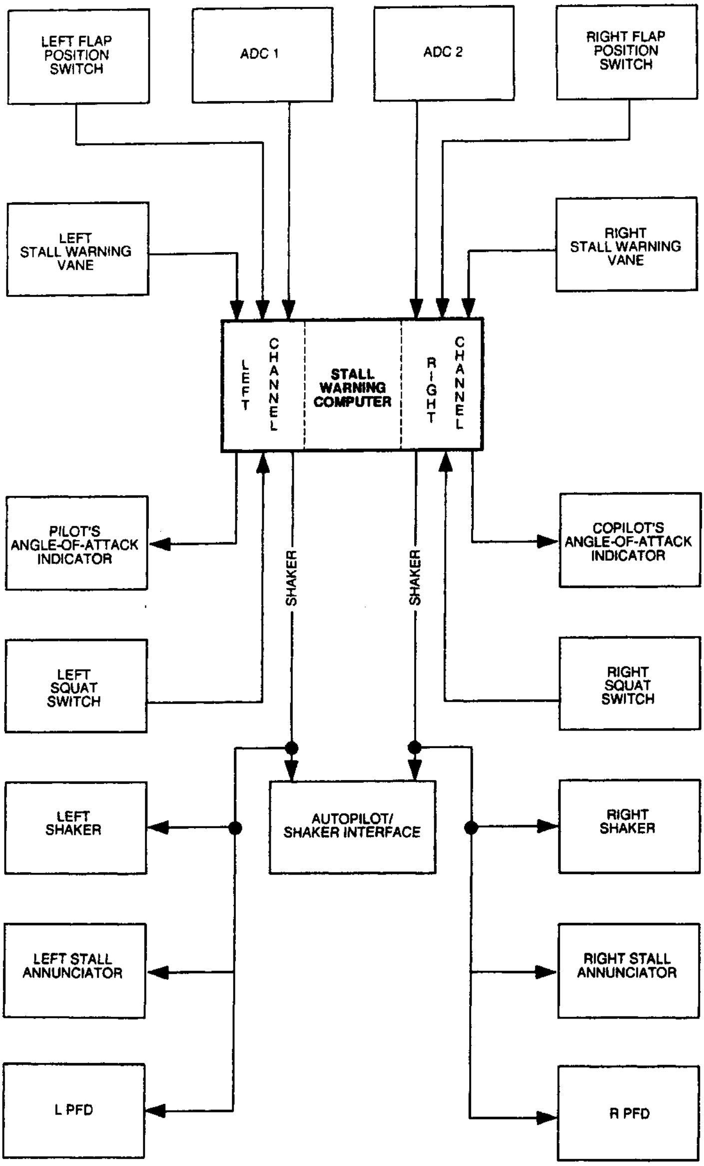
PEDESTAL TRIM CONTROL PANEL
Figure 5-4

WARNING SYSTEMS

STALL WARNING SYSTEM

A stall warning system is installed to provide the crew with visual and tactile warning of an impending stall. The major components of the stall warning system consist of the following: left and right stall vanes on the forward fuselage, a two-channel computer-amplifier, flap position switches for each flap, two 18,100-foot altitude switches, a stick shaker for each crew position, an angle-of-attack indicator for each crew position, L and R STALL warning lights, and associated aircraft wiring. The flap position switches provide bias information to the computer-amplifier which will decrease stall warning speeds as the flaps go from 0° to 40°. Above approximately 18,100 feet pressure altitude, the altitude switches bias the system to increase stall warning speeds approximately 15 knots. The stick shakers are eccentric weights driven by an electric motor and actuation is evidenced by a high-frequency vibration of the control columns. The left and right systems are completely independent and utilize separate electronics, stall vanes, altitude switches, shaker motors, and flap switches. The stall warning system operates on 28 VDC supplied through the 5-amp L and R STALL WARN circuit breakers on the pilot's and copilot's circuit breaker panels respectively. The stick shaker and STALL warning light circuits are wired through the squat switches; therefore, the stick shaker and STALL warning lights are deactivated when the squat switches are in the ground mode. The stick shaker and STALL warning lights will be deactivated for 3 to 5 seconds after lift-off. The angle-of-attack indicators remain active both on the ground and inflight, however the angle of attack displays are not available on the PFD while on the ground. The stall warning systems may be tested on the ground using the rotary-type systems test switch, located on the center instrument panel.

During flight, the stall warning vanes align with the local airstream and transducers produce a voltage proportional to airplane angle of attack. The transducer signals are transmitted to the appropriate computer-amplifier channel along with flap position information from the flap position switches and altitude information from the altitude switches. The angle-of-attack indicator pointers will enter the yellow segment, the L and R STALL lights will illuminate and flash, and the stick shakers will actuate when the angle of attack increases to an angle corresponding to an airspeed at least 7% above the stall speed published in the Airplane Flight Manual.



STALL WARNING SYSTEM BLOCK DIAGRAM
Figure 5-5

ANGLE-OF-ATTACK INDICATORS

The angle-of-attack indicators, located on the pilot's and copilot's instrument panels, translate signals from the stall warning computer-amplifier into a visual indication of angle-of-attack. These indicators present normalized angle-of-attack information for all flap settings on a scale from 1.0 (max lift) to 0 (zero lift). The left stall warning system utilizes the pilot's angle-of-attack indicator and the right stall warning system utilizes the copilot's angle-of-attack indicator. Each indicator face is divided into three segments as follows: green -safe, yellow -caution/shaker, and red -warning.

In addition to angle-of-attack indicators, low speed cues are displayed on the left side of the PFDs. They indicate impending stall speed (speed at which the stick shaker triggers), and a 1.3Vs approach cue. These cues are only visual cues that reflect AOA data and are not intended to replace the actual stall warning system.

STALL WARNING LIGHTS

The red L and R STALL warning lights, located in the glareshield annunciator panel, are installed to indicate impending stall or a system malfunction. During flight operations, the lights will illuminate and flash when the shaker is actuated. The lights are pulsed at the same frequency and duration as the shakers; therefore, the flash frequency will increase as the angle-of-attack increases from initial shaker actuation. At or just prior to the angle-of-attack pointer entering the red segment, the flash frequency is sufficient to cause the lights to appear steady.

SYSTEM TEST SWITCH — STALL WARNING FUNCTION

The rotary-type system test switch, located on the center instrument panel, is used to test the left and right stall warning systems. Each system is individually tested through the L STALL and R STALL positions of the system test switch. The test is initiated by rotating the system test switch to L or R STALL (as applicable) and then depressing the switch PRESS TEST button. When the test sequence is initiated, the corresponding angle-of-attack indicator pointer will begin to sweep from the green segment toward the red segment. As the pointer passes the green-yellow margin, the stick-shaker will actuate, Master WARN lights will illuminate, and the applicable STALL light will begin to flash. Shaker actuation is made evident by high frequency vibration of the control column.

OVERSPEED WARNING SYSTEM

The overspeed warning system provides an audible overspeed warning in the event aircraft speed exceeds a Mach or airspeed limit. The overspeed warning horn is activated by the air data computers when the position of the airspeed and the maximum allowable airspeed coincide. 28 VDC for system circuits is supplied through the 7.5-amp WARN LTS circuit breakers on the pilot's and copilot's circuit breaker panels and will be powered during emergency bus operations. The overspeed warning horn will sound under any of the following conditions:

1. Airspeed exceeds VMO.
2. Mach exceeds MMO.

SYSTEM TEST SWITCH — OVERSPEED WARNING FUNCTION

The rotary-type system test switch, located on the center instrument panel, is used to test the overspeed warning system. The test sequence is initiated by rotating the system test switch to OVSP and then depressing the switch PRESS TEST button. The overspeed warning will sound three times, each separated by a brief pause. The third warning horn will continue until the TEST button is released.

TAKEOFF WARNING SYSTEM

The takeoff configuration monitor system consists of a monitor box, throttle quadrant switch and various system switches (provide the input signals to the monitor box). The system is active when the aircraft is on the ground (right squat switch in ground mode). A takeoff monitor aural warning will sound during ground operations when the right thrust lever is advanced to the MCR position or above and one or more of the following conditions exist:

1. Thrust reverser unlocked or deployed.
2. Flaps not set for takeoff.
3. Spoilers not retracted.
4. Pitch trim not in a safe position for takeoff.
5. Parking brake not released.

GROUND PROXIMITY WARNING SYSTEM (GPWS) WITH WINDSHEAR DETECTION (OPTIONAL)

The Ground Proximity Warning System with Windshear Detection (GPWS/WS) provides the pilot with aural and visual warning of potentially dangerous flight paths relative to ground and windshear conditions.

The system automatically and continuously monitors the airplane's flight path with respect to terrain when the aircraft is below 2450 feet radio altitude (altitude AGL). If the airplane's projected flight path would imminently result in terrain impact, the system issues appropriate visual and voice warnings. Warnings are issued for excessive sink rate, excessive terrain closure rate, descent after takeoff or missed approach, proximity to terrain with flaps and/or gear up, descent below glideslope, and descent below decision height (DH).

The system computes windshear and alerts the crew of windshear of sufficient magnitude to be hazardous to the aircraft. Windshear alerts are given for increasing headwind/decreasing tailwind and/or updraft. Windshear warnings are given for decreasing headwind/ increasing tailwind and/or down-draft.

Issuance of a GPWS/WS warning (red PULL UP or red WNDSHR) will trigger the Master WARN lights to flash. Issuance of a GPWS/ WS alert (amber GPWS FAIL, amber WIND SHEAR FAIL, amber BELOW G/S, or amber WNDSHR) will trigger the Master CAUT lights to flash.

The system consists of the GPWS/WS computer, a set of annunciator light/switches on the instrument panel at each crew position, a flap override switch, and associated aircraft wiring. Voice warnings are made through the cockpit speakers and the headphones. Voice warnings generated by the GPWS will have priority over voice warnings generated by the TCAS (if installed). The system receives inputs from either air data computer, either AHRS, both stall warning vanes, radio altimeter, both nav receivers, nose gear down and locked switch, and the left flap 8°, 20°, and 40° switch. The system operates on 115 VAC supplied through the 1-amp GPWS circuit breaker and 28 VDC supplied through the 1-amp GPWS circuit breaker on the pilot's circuit breaker panel.

Refer to the applicable AFM supplement for further details and operating instructions.

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS) (OPTIONAL)

The Traffic Alert and Collision Avoidance System (TCAS) provides the pilot with aural and visual indications of potentially dangerous flight paths relative to other aircraft in the vicinity. The system uses the transponder to interrogate other transponder-equipped aircraft and determine their bearing, range, and altitude. With this information, the TCAS processor can generate advisories to prevent or correct traffic conflicts.

The TCAS consists of a receiver/transmitter/processor, two directional antennas, and associated aircraft wiring. Power for system operation is 28 VDC supplied through the 5-amp TCAS circuit breaker on the copilot's circuit breaker panel.

Advisories are issued to the crew via the aircraft audio system and integrated displays (PFDs and MFDs). Aural advisories generated by the ground proximity/windshear warning system (if installed) will have priority over aural advisories generated by the TCAS.

Refer to applicable AFM supplement and Collins Pilot Guide for further details and operating instructions.

AIR DATA SYSTEMS

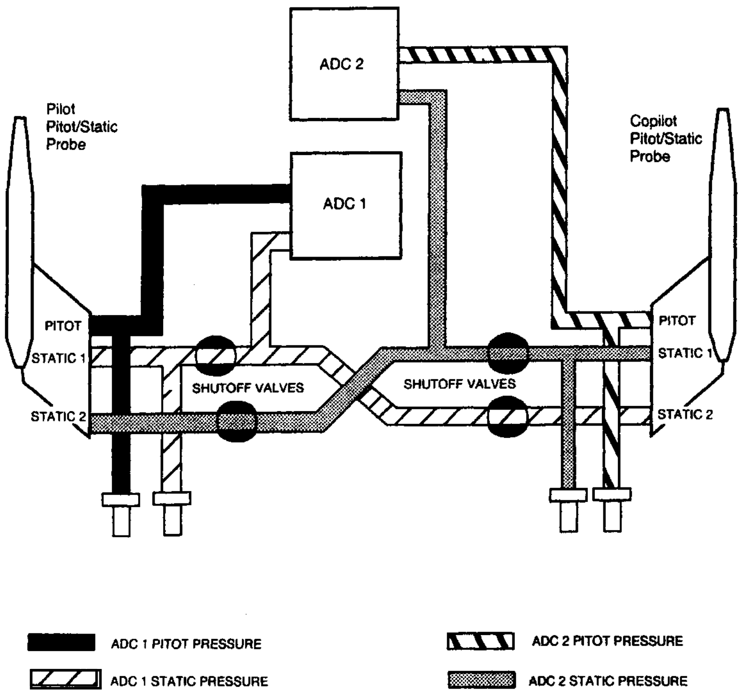
Air data for instruments and equipment requiring flight environment air data for display or operation is provided by two separate air data systems. The dual primary air data system consists of the primary pitot-static system, two air data computers, two air data reference panels (ARP), a total temperature probe and reversionary mode switch/ annunciators. A separate standby pitot-static system is installed to provide flight environment air data for display on the standby instruments.

PRIMARY PITOT-STATIC SYSTEM

Pitot and static pressure for the air data computers and other using systems is obtained from the two primary pitot-static probes. One probe is located on each side of the nose compartment. Each probe contains a pitot (impact pressure) port and two static pressure ports. The probes also contain electrical heating elements controlled by the L and R PITOT HEAT switches. Four drain valves, located near the nose gear doors, are installed at the system low spots to drain moisture from the system. The pilot's pitot system is completely independent of the copilot's pitot system and utilizes the left pitot-static probe as the source of pitot pressure. The copilot's system utilizes the right pitot-static probe to obtain pitot pressure. The pilot's and copilot's systems each utilize a separate static source on each of the probes. A solenoid-operated shutoff valve is installed in each static source line to assure accurate static pressure in the event one probe becomes clogged or unreliable. The shutoff valves are controlled through the STATIC SOURCE switch on the pilot's switch panel and operate on 28 VDC supplied through the 7.5-amp STATIC SOURCE circuit breaker on the copilot's circuit breaker panel.

The pilot's pitot source supplies pitot pressure for ADC 1 air data computer. The copilot's pitot source supplies pitot pressure for ADC 2 air data computer.

Each pitot-static probe contains two static sources. One static source on each probe is interconnected with a static source on the opposite probe to supply static pressure to ADC 1. The other static source on each probe is interconnected with a static source on the opposite probe to supply static pressure to ADC 2. In the event a static source becomes clogged or unreliable, the affected pitot-static probe's static sources can be isolated, allowing all equipment to be operated from static sources on the opposite probe.



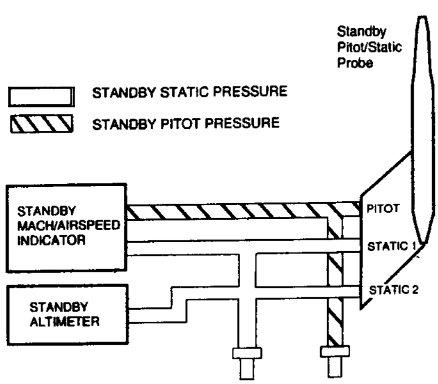
PRIMARY PITOT-STATIC SYSTEM SCHEMATIC
Figure 5-6

STATIC SOURCE SWITCH

The STATIC SOURCE switch controls solenoid-operated shutoff valves, in the static plumbing, to assure accurate static pressure sensing in the event one of the pitot-static probes become inoperable or unreliable. The STATIC SOURCE switch, located on the pilot's switch panel, has three positions: L, BOTH, and R. When the switch is in the BOTH position all four shutoff valves are de-energized open and static pressure for the air data instruments and equipment is available from static ports in both pitot-static probes. Normally, the switch is in the BOTH position for all operations. When the switch is set to L or R, the shutoff valves for the opposite pitot-static probe are energized closed, and static pressure will be supplied by the selected pitot-static probe only.

STANDBY PITOT-STATIC SYSTEM

The standby pitot-static system is independent of the primary system and supplies pitot-static pressure to the standby Mach/airspeed indicator and the standby altimeter. The standby pitot-static probe is located on the right side of the nose compartment. This probe contains a pitot (impact pressure) port and two static pressure ports. The standby pitot-static probe contains an electrical heating element controlled by the R PITOT HEAT switch. Two drain valves, located near the nose gear doors, are installed at the system low spot to drain moisture from the system.



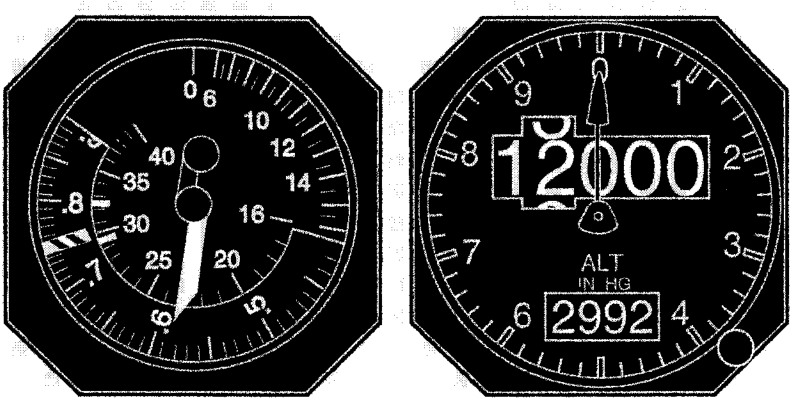
STANDBY PITOT-STATIC SYSTEM SCHEMATIC
Figure 5-7

STANDBY AIRSPEED/MACH INDICATOR *(Aircraft 60-001 thru 60-248)*

The standby airspeed/Mach indicator is installed on the center instrument panel. The indicator face consists of a stationary, circular airspeed scale reading from 0 to 400 knots, a moveable Mach scale, an airspeed/Mach pointer and a maximum allowable marker (barber pole). The Mach scale rotates with changes in altitude to maintain the correct Mach/airspeed relationship for any given altitude. The maximum allowable marker rotates with the Mach scale and maintains a position at 0.75 MI. The pointer responds to pitot and static pressure from the standby pitot-static probe. The standby airspeed/Mach indicator is used to cross check pilot and copilot airspeed displays and serves as a back up unit in the event both pilot's airspeed data becomes invalid.

STANDBY ALTIMETER *(Aircraft 60-001 thru 60-248)*

One of two types of standby altimeter is installed on the center instrument panel. The altimeter displays altitude on the counter-drum-pointer presentation. The altimeter dial is graduated in 2-foot increments from 0 to 1000. The pointer makes one complete revolution per 1000 feet of altitude. The counter rotates to produce a digital display of altitude in ten thousands and thousands of feet. The hundreds, tens and units places are fixed zeros. A Kollsman window displays the altimeter setting in inches of mercury (IN HG). The altimeter setting is entered by rotating the set knob on the altimeter bezel. The standby altimeter responds to static pressure from the standby pitot-static probe. The standby altimeter is used to cross check pilot and copilot altitude displays and serves as a back up unit in the event both pilot's altitude data becomes invalid.



STANDBY AIRSPEED/MACH INDICATOR AND ALTIMETER (Typical)
Figure 5-8

AIR DATA COMPUTERS

Two digital air data computers receive pitot and static pressures from the primary pitot-static system and temperature data from the total temperature probe for computation of the flight environment. Operator input to the air data computers is accomplished via the Air Data Reference Panel (ARP). The computed results of the sensor inputs are converted to electrical signals and transmitted to the associated cockpit displays. Additional outputs from the air data computers are transmitted to the integrated avionics processor system (IAPS) for distribution to other systems that require air data for proper operation. The following table summarizes the various outputs under normal conditions. The air data computers operate on 28 VDC through the ADC-ARP circuit breakers on the pilot's and copilot's circuit breaker panels. ADC 1 is operative during EMER BUS operations.

ADC 1	ADC 2
• Pilot's Instruments Airspeed/Mach Altitude/Vertical Speed • Altitude Alert • L Stall Warning • Gear Warning • Overspeed profile • AHS 1 (TAS) • Pilot's EFIS • L FCS • Mach Trim • ATC 1 (encoded altitude) • FMS 1 • Pressurization Controller • FADEC • SAT • TAS	• Copilot's Instruments Airspeed/Mach Altitude/Vertical Speed • Altitude Alert • R Stall Warning • Gear Warning • Overspeed profile • AHS 2 (TAS) • Copilot's EFIS • R FCS • ATC 2 (encoded altitude) • FMS 2 • Pressurization Controller • FADEC • SAT • TAS

Refer to "Collins Pro Line 4 Avionics System For The Learjet 60" (P/N 523-0777003) and the Learjet 60 FAA Approved Airplane Flight Manual (FM-123) for additional operational information and a complete description of the air data system interfaces and instruments.

ADC/ADC TRANSFER SWITCH

The ADC/ADC transfer switches on the EFIS CONTROL panels are used to select the ADC source for display on the on-side display. On-side ADC is the normal selection indicated by a green annunciation of the switch. Reversionary (cross-side) selection is indicated by an amber annunciation on the switch. ADC reversion on either side will also cause the following annunciations: "ADC #" (# = system supplying air data [1 or 2]) on both PFDs.

AIR DATA REFERENCE PANEL (ARP)

Two ARPs (one on the pilot's instrument panel and one on the copilot's instrument panel) provide the means for selecting particular air data for display on the cockpit displays. The panels house the controls that are used to set the airspeed references, vertical speed references, preselected altitude, barometric pressure correction and temperature display format. This data is applied to the on-side ADC.

ATTITUDE HEADING SYSTEM

Aircraft avionics displays and equipment requiring attitude or heading information are supplied that information from the dual, independent Collins Attitude Heading Systems (AHS 1 and AHS 2). Each system consists of an attitude heading computer with internal compensator, a magnetic flux sensor in the associated wing tip, two HEADING control switches, and associated aircraft wiring. The attitude heading computer is composed of inertial instruments, electronics, interface hardware, processing and memory circuits to provide attitude and heading information to other aircraft systems. One magnetic slaving unit is located in each wing tip and is used to sense the earth's magnetic field. The HEADING SLAVE-FREE switch allows the crew to select either Free or Slaved Magnetic Heading mode. The system has two operating modes, normal and basic. During normal operation, a true airspeed input is supplied by the air data system to improve accuracy. If the true airspeed input is lost, the system will continue to operate in the basic mode. AHS operation is automatic and both systems will initialize when battery power is applied to the aircraft. During the nominal 70 second alignment, the system determines its orientation with the local vertical and magnetic North and performs a series of self-test and calibration functions. The AHS 1 and 2 systems are powered by 28 VDC 5-amp AHS 1 and AHS 2 circuit breakers on the pilot's and copilot's circuit breaker panels. Both AHS 1 and AHS 2 will be powered during EMER BUS operations. In the event of a power loss, approximately 11 minutes of back-up power (28 VDC) will be supplied to AHS 1 and AHS 2 by EMER BAT 2. This feature makes it unnecessary to reinitialize the system should a momentary power loss be experienced. Should one of the systems fail, the functions of the failed system may be assumed by the remaining system using the AHS/AHS reversionary mode.

Attitude/heading data is provided for the following using systems:

- **EFIS Displays** — attitude and heading displays
- **Flight Control System** — attitude, heading and acceleration data
- **Weather Radar** — pitch and roll data for antenna stabilization
- **Flight Management System** — heading data
- **StormScope** (if installed) — pitch and roll data for heading stabilization

HEADING CONTROL SWITCHES

The HEADING control switches, located in the AVIONICS group on the pilot's and copilot's switch panels, are used to control the heading

output of the associated AHS. The switches on the pilot's side control AHS 1 while the switches on the copilot's side control AHS 2. The SLAVE-FREE switch provides slaving mode selection for the associated AHS heading output. When the switch is set to SLAVE, the associated AHS heading output will be referenced to its magnetic slaving unit and the associated compass cards will reflect this "slaved" alignment. When the switch is set to FREE, the associated AHS heading output will not be referenced to its magnetic slaving unit. The SLAVE L-R switch provides for manual slewing of the associated compass cards. Small heading splits can usually be cleared by cycling the SLAVE-FREE switch to FREE and then back to SLAVE while the aircraft is in straight and level, unaccelerated flight.

AHS/AHS REVERSIONARY MODE

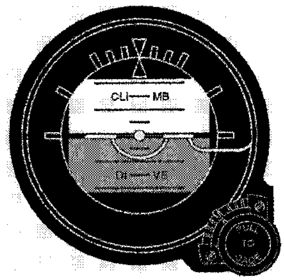
The AHS/AHS switches on the EFIS CONTROL panels are used to select the attitude heading system for the respective EFIS display and flight director. On-side AHS is the normal selection indicated by green annunciation on the switch. Reversionary (cross-side) selection is indicated by an amber annunciation on the switch. AHS reversion on either side will also cause the following annunciations: "ATT #" (# = system supplying attitude data [1 or 2]) on both PFDs and "MAG #" (# = system supplying heading data [1 or 2]) above each compass card.

STANDBY ATTITUDE INDICATOR *(Aircraft 60-001 thru 60-248)*

TWO-INCH INDICATOR

A standard 2-inch standby attitude indicator (figure 5-9) may be installed on the center instrument panel. The indicator will provide 92° of climb, 78° of dive, and 360° of roll attitude information. A sky pointer is incorporated to indicate vertical in any roll attitude. Roll index marks at 10°, 20°, 30°, 60° and 90° provide measurement of angular displacement from vertical as indicated with the sky pointer. The two colored pitch drum is directly linked to the spin motor of the gyro to provide direct reading of aircraft attitude in both pitch and roll. The light colored area marked CLIMB represents the sky. The dark colored area marked DIVE represents the earth. A horizontal white line divides the colored areas to represent the horizon. Index marks are incorporated on the drum to indicate every 5° of pitch in both CLIMB and DIVE attitudes. The adjustable miniature airplane symbol indicates aircraft pitch and roll attitude relative to the horizon. The symbol is adjustable through 5° of pitch in both CLIMB and DIVE directions using the PULL TO CAGE knob. Rotating the knob moves the symbol and a pointer that indicates symbol pitch displacement on a scale marked in 1° increments. The knob is slowly pulled out and rotated clockwise to cage the gyro. When released, the knob will remain in the extended position. A

red OFF flag will appear if the gyro is caged, power is not applied or was lost, or the gyro becomes inoperative. The standby attitude indicator is powered by 28 VDC supplied by EMER BAT 1. The standby attitude indicator is used to cross check the pilot and copilot attitude displays and serves as a back up unit in the event both AHS 1 and AHS 2 become inoperative.



STANDBY ATTITUDE INDICATOR
Figure 5-9

THREE-INCH INDICATOR

An optional J.E.T. ADI-331 standby attitude indicator may be installed in place of the standard 2-inch indicator. It is a 3-inch, self-contained gyro powered by 28 VDC supplied from EMER BAT 1. This unit incorporates all of the features described for the 2-inch unit as well as crosspointers to show deviation from glideslope and localizer beams. If the signal becomes invalid, GS and/or LOC flags will come into view and the associated crosspointer(s) will be stowed. The crosspointers and flags are active only when an ILS frequency is tuned on the #1 NAV receiver. An inclinometer, on the front of the instrument, shows aircraft slip/skid information.

The ADI-331 installation is designed to provide attitude, glideslope, and localizer information independent of the normal electrical system. In the event the normal electrical system fails, EMER BAT 1 will supply 28 VDC to power the standby attitude indicator, and EMER BAT 2 or EMER BAT 1 will supply 28 VDC to power the #1 NAV receiver and the #1 Radio Tuning Unit (RTU). Although the #1 RTU will be operative under these conditions, its only meaningful function will be to tune the #1 NAV receiver to an ILS frequency since the COM, ADF, and ATC equipment will be inoperative.

ELECTRONIC STANDBY INSTRUMENT SYSTEM *(Aircraft 60-001 thru 60-248)*

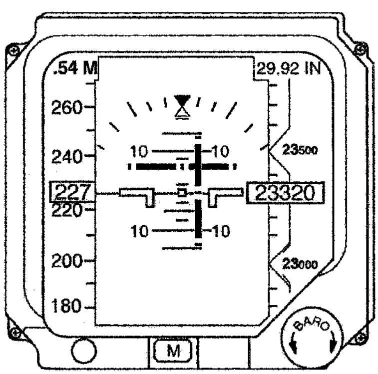
An optional Electronic Standby Instrument System (ESIS) is available and replaces the standby attitude, altimeter and airspeed/Mach indicators located on the center instrument panel. This single LCD indicator provides the pilot and copilot with pitch and roll attitude, slip/skid information, baro altitude, airspeed, Mach, dual baro-set, VMO/MMO, localizer and glideslope deviation and marker beacon annunciation. The system consists of a remote air data computer and an ESIS display indicator. For a detailed description of this system refer to the current BF Goodrich Aerospace GH-3000 Electronic Standby Instrument System Pilot's Guide.

REMOTE AIR DATA COMPUTER

The remote air data computer receives pitot and static pressure from the standby pitot-static system and provides airspeed and altitude information to the display indicator. The remote air data computer is powered by EMER BAT 1.

ESIS DISPLAY INDICATOR

The ESIS display indicator presents information on a color active matrix liquid crystal display. The display format resembles that of the Primary Flight Displays (PFDs). The indicator is powered by EMER BAT 1.

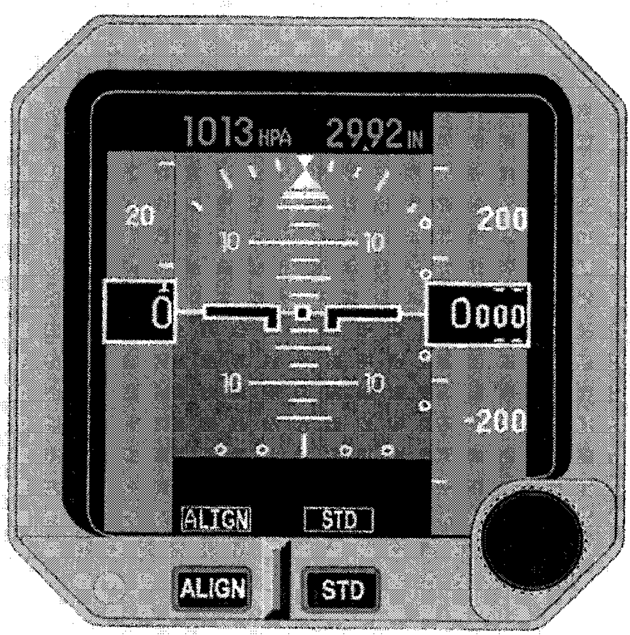


ELECTRONIC STANDBY INSTRUMENT SYSTEM INDICATOR
Figure 5-9A

INTEGRATED STANDBY INDICATOR SYSTEM (ISIS)
(Aircraft 60-249 and Subsequent)

An Integrated Standby Indicator System (ISIS) is located on the center instrument panel. This indicator is a Smiths Industries solid state, graphic display standby indicator system. The system consists of a self-sensing single box unit and is powered by 28 VDC supplied by EMER BAT 1. Power is also provided to RTU 1 and NAV 1. This single LCD indicator provides the pilot and copilot with pitch and bank angle, slip/skid indications, altitude, airspeed, Mach number, dual baro-set, and VMO/MMO indications. Localizer and glideslope deviation is provided if NAV 1 is tuned to an ILS. It is designed to mimic the primary EFIS system.

For a more detailed description of this system, refer to the current Smiths Industries Integrated Standby Indicator System Pilot's Guide (P/N CDK316).



INTEGRATED STANDBY INDICATOR SYSTEM
Figure 5-9B

MAGNETIC COMPASS

A direct-reading magnetic compass is installed on the windshield center post. The liquid filled compass contains a horizontal drum dial and a lubber line. The drum has a 360° scale graduated in 5° increments. Numerical markings appear at 30° intervals except that 0, 90, 180 and 270 are labeled N, E, S, and W respectively. N/S and E/W compensator screws are located under the cover plate. A compass steering correction card is located near the compass.

ELECTRONIC FLIGHT INSTRUMENT SYSTEM

The electronic flight instrument system is a Collins 4-tube IDS-850 instrument display system with a single sensor display unit. The system consists of a primary flight display (PFD) and a multifunction display (MFD) on each pilot's instrument panel, one sensor display unit (SDU), one course and heading panel (CHP), two EFIS Control panels (ECP), and two Control Display Units (CDU). When equipped with the Universal Avionics System Corporation (UASC) FMS, two EFIS Radar Panels (ERP) are installed. Cooling for the PFDs and MFDs is provided by fans integral to each display unit and an avionics cooling fan. Failure of the avionics cooling fan is indicated by illumination of the white INSTR FAN annunciator on the glareshield annunciator panel. The system is powered by 28 VDC from the following circuit breakers: 10-amp PFD 1 & 2, 10-amp MFD 1 & 2, 3-amp SDU PWR 1 & 2, 5-amp EFIS CTL 1 & 2, and 3-amp CDU-AAP 1 & 2. On the UASC configuration, the 3-amp CDU-AAP 1 & 2 circuit breakers are replaced by the 0.5-amp ERP-AAP 1 & 2 circuit breakers.

The EFIS is used to display airplane altitude, airspeed/Mach, vertical speed, air temperature, attitude data, navigational data, flight director commands, mode annunciators, weather, checklists, warnings, and diagnostic messages.

The EFIS Radar Panels (ERP) enable the UASC FMSes to function as an external navigator to the Collins Pro Line 4 Avionics System. The ERP controls weather radar as well as certain Collins MFD displays and are installed below the UASC FMS CDUs.

The following description covers the system in a general manner and is intended for familiarization only. Refer to "Collins Pro Line 4 Avionics System For The Learjet 60" (P/N 523-0777003), the Learjet 60 FAA Approved Airplane Flight Manual (FM-123) and UASC Operator's Manual (if applicable) for additional operational information and a complete description of the EFIS interfaces and instruments.

INSTRUMENT DISPLAY SYSTEM (IDS)

The IDS uses four 7 X 6-inch composite color CRTs to display airplane attitude data, navigational data, flight director commands, mode annunciators, weather, checklists, warnings, and diagnostic messages. Each pilot is faced with a Primary Flight Display (PFD) and a Multifunction Display (MFD). The PFD is the outboard tube and the MFD is the inboard tube. The MFDs serve as a backup for the on-side PFD in the event of a display failure.

PRIMARY FLIGHT DISPLAY (PFD)

The PFD on each side displays attitude, primary air data and lateral navigation display elements. The PFDs provide the following information:

Pitch and Roll Attitude	Flight Director Commands
Mode Annunciations	Heading, Course & Bearing
Vertical Speed	Airspeed
Baro Corrected Altitude	Radio Altitude
Altitude Preselect	Reporting Altitude, MDA & DH Set
Temperature	VNAV Deviation (if supported by FMS)
DME Data	Warning Annunciations & Flags
Marker Beacon	Glideslope and Localizer Deviation
TCAS RAs (if installed)	

MULTIFUNCTION DISPLAY (MFD)

The MFD on each side brings together numerous displays to show a map-like presentation of the airplane's horizontal navigation situation. The MFDs provide the following information:

Heading	DME Data
Source Annunciations	Warning Annunciations & Flags
Course Deviation	VNAV Deviation (if supported by FMS)
Selected Heading	Selected Course/Desired Track
Bearing Pointer	Weather Radar
Wind	

In addition, the MFD is capable of displaying the following information:

Checklists	Flight Plan Map
Maintenance Diagnostics	Nearby Nav Aids, Airports, etc.
Avionics Status	Performance and Progress
Sensor Status	TCAS TFC Display (if installed)

SENSOR DISPLAY UNIT (SDU)

The SDU is an electronic RMI display that uses a 3 X 3-inch high-resolution monochrome CRT to display airplane heading and backup navigational data. The single SDU is installed in the center instrument panel between the radio tuning units. The SDU is able to display data from either VOR/ILS receiver, either DME, one or two VLF/Omega receivers, one or two MLS receivers, and one or two FMS systems. Airplane heading is obtained from AHS 1 and is displayed with all SDU formats.

COURSE HEADING PANEL (CHP)

The single CHP is located forward of the CDUs in the pedestal. The CHP provides the selected course and selected heading controls for the course arrows and heading bugs on the PFDs/MFDs.

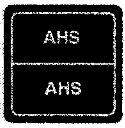
The course knobs (CRS 1 & 2) are used to change the active selected course on the on-side PFD/MFD when VOR is the active NAV sensor. When FMS is the active NAV sensor and in the SEL CRS mode, these knobs change the course angle to the TO waypoint. Pressing the center PUSH DIRECT switch on either CRS knob will zero the course deviation and establish a course directly to the active NAV sensor.

The HDG knob between the CRS 1 & 2 knobs is used to change the selected heading indicated by the heading bug on both PFDs and MFDs simultaneously. Pressing the inset PUSH SYNC switch in the center of the HDG knob will synchronize the heading bug on all of the large displays to the current airplane heading as read under the lubber line on the pilot's PFD.

The joystick is used to position the cursor on the MFD. The joystick may also be used to scroll through MFD page data, or to select an FMS waypoint on the MFD map display.

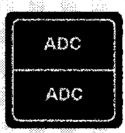
EFIS CONTROL PANEL

An EFIS control panel is installed on both the pilot's and copilot's instrument panel. Each panel controls its respective EFIS. Each switch is an alternate action switch. On-side selection is indicated by a green annunciation and cross-side or reversionary mode selection is indicated by an amber annunciation.

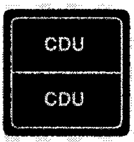


This switch selects the attitude heading system for the respective EFIS display, flight director and other systems requiring attitude or heading data. The switch is used to recover attitude and heading data if the on-side AHS fails.

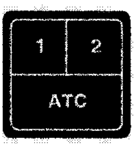
Whenever cross-side AHS data is selected, the pitch, roll, and heading comparators will be disabled, and all equipment normally sourced by the on-side AHS will be sourced by the cross-side AHS.



This switch selects the air data system for the respective EFIS display, flight director and other systems requiring air data. The switch is used to recover air data if the on-side ADC fails.

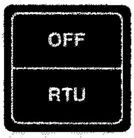


This switch selects the control display unit for the respective EFIS display. The switch is used to recover control if the on-side CDU fails.



This switch selects the active transponder system (1 or 2). Transponder 1 is normally controlled by the left RTU and transponder 2 by the right RTU.

This reversionary mode selection switch is used to recover data on the PFD. When actuated in the REV mode, the adjacent MFD will assume the functions of the PFD. This would be used if a PFD tube fails.



This switch is used to disable the on-side RTU. In the normal mode, the RTU will control the on-side radios. When switched to the OFF mode, the RTU will blank and all radios will be controlled by the cross-side RTU. This would be used if the on-side RTU fails.

This switch is installed only if a Collins (single or dual) FMS is installed and is used to disable remote tuning of all radios via the CDUs and FMS autotune functions. In the normal mode, the radios may be controlled by the RTU, CDUs or FMS autotune function. When switched to the OFF mode, only the RTUs may be used to control the radios.

CONTROL DISPLAY UNIT (CDU)

Either dual Collins or UASC CDUs are installed in the pedestal to control the PFDs, MFDs, FMS, and weather radar. The CDUs also provide an additional method (other than the RTUs) for tuning NAV/COM radios and entering transponder codes. The CDU uses a combination of displayed menus, line-keys, full alphanumeric keypad, control knobs and dedicated control keys. In most cases, the CDUs can be operated simultaneously or independently. For instance, the pilot may change or edit the flight plan while the copilot controls the weather radar or manages NAV/COM frequencies. Neither CDU has priority over the other. If both CDUs tune the same radio, the most recent change is the one that will be used. The pilot should note that there are some functions that cannot be done simultaneously. In addition to the UASC CDUs, two ERPs are installed. The UASC CDU/ERP combination replaces the Collins CDU with operation remaining similar.

COMMUNICATIONS

VHF COMMUNICATIONS

Dual VHF communications transceivers and controls are installed to provide AM voice communication capability.

Several VHF COMM packages are available:

Available Package	Frequency Range	Frequency Spacing
1	118.00 to 135.975 MHz	25 kHz steps
2	118.00 to 151.975 MHz	25 kHz steps
3	118.00 to 136.975 MHz	8.33 kHz steps
4	118.00 to 136.975 MHz	8.33 kHz steps
	137.00 to 151.975 MHz	25 kHz steps

The transceivers are SELCAL compatible with analog audio interfaces. Tuning is accomplished via the Radio Tuning Units (RTU) on the center instrument panel or via the Control Display Units (CDU) in the pedestal. Collins or UASC CDUs have similar radio management functions but differ on RTU failure procedures. (Refer to AFM for detailed malfunction information). The design of the system is such that all radio management functions are channeled through the RTUs, regardless of their origin. The left RTU normally tunes COMM 1 and the right RTU normally tunes COMM 2. If an RTU fails, the remaining RTU is capable of tuning both COMM 1 and COMM 2. Power for the system is 28 VDC supplied through the 7.5-amp COMM 1 and COMM 2 circuit breakers on the pilot's and copilot's circuit breaker panels. COMM 1 is powered during EMER BUS operations.

The above information is presented in a general manner and is intended for familiarization only. For a detailed description and operation of the VHF communications system refer to "Collins Pro Line 4 Avionics System For The Learjet 60" (P/N 523-0777003).

HF COMMUNICATIONS

An HF (high frequency) communication system is installed to provide long range communication capability. The system operates on any 0.1 kHz frequency between 2.0 and 29.9999 MHz. The system consists of a control/display unit (pedestal), a remote power amplifier and antenna coupler, remote receiver/transmitter, and antenna. System power is 28 VDC supplied through current limiters and controlled by a remote control circuit breaker. The remote control circuit breaker is controlled by the 0.5-amp HF 1 circuit breaker on the pilot's circuit breaker panel. The HF receiver is SELCAL compatible.

The above information is presented in a general manner and is intended for familiarization only. For a detailed description and operation of the HF communications system refer to the appropriate HF operators manual.

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SELCAL

The SELCAL system permits the selective calling of individual aircraft over normal radio communications circuits linking the ground station with the aircraft. The SELCAL system is integrated into the VHF and HF communication systems to relieve the flight crew from continuously monitoring communications frequencies during flights of extended duration. The system consists of a decoder unit and the SELCAL control panel located on the center instrument panel. The system is powered by 28 VDC through the 1-amp SELCAL circuit breaker on the pilot's circuit breaker panel.

When a call is received, the appropriate annunciator (VHF 1, VHF 2, HF 1 or HF 2) in the SELCAL control panel will illuminate and an intermittent aural tone will sound. The annunciator is then depressed and communication with the caller can be established. When the button is depressed, the aural tone will cease.

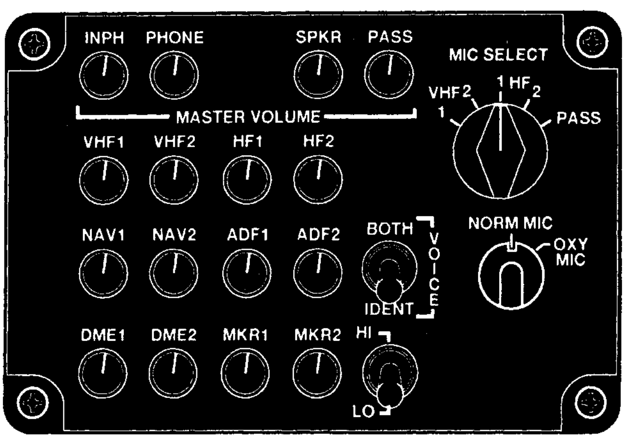
The system may be tested by depressing the SELCAL TEST button. When this is done, all three annunciators will illuminate and an aural tone will sound. In order to extinguish the annunciators, each button must be depressed. The aural tone will cease when the last button is depressed.

AUDIO CONTROL SYSTEM

The audio control system is used to select the desired audio inputs for broadcast through the speakers or headphones. The audio control system is also used to select the desired transmitter to which microphone inputs will be directed. A separate audio control system is provided for pilot and copilot. Each system consists of an audio amplifier and audio control panel The audio control system operates on 28 VDC supplied through the 5-amp L and R Audio circuit breakers on the pilot's and copilot's circuit breaker panels respectively. The audio control systems will operate during EMER BUS mode.

AUDIO CONTROL PANEL

An audio control panel is installed at the outboard end of the pilot's and copilot's instrument panels. Each panel provides the controls necessary to direct audio signals and adjust volume levels. Each panel is used in conjunction with the on-side microphone, headphone and cockpit speaker.



AUDIO CONTROL PANEL
Figure 5-11

MIC SELECT SWITCH

The MIC SELECT Switch is a multi-position rotary-type switch labeled VHF 1, VHF 2, HF 1, and HF 2, and PASS. This switch provides the proper microphone audio inputs for the respective functions.

VHF 1, VHF 2, HF 1 and HF 2 Positions — When any of these positions are selected, microphone inputs are provided for the respective transceiver. Microphone must be keyed to transmit.

PASS Position — When this position is selected, the pilot or copilot, utilizing this function, may speak to the passengers through the passenger speaker. Microphone must be keyed to transmit. PASS should not be selected on both audio control panels simultaneously as degradation of the volume level may result.

NORM MIC/OXY MIC SWITCH

NORM MIC Position — When the switch is in this position, voice transmissions are accomplished with the headset microphone or hand-held microphone.

OXY MIC Position — When the switch is in this position, voice transmissions are accomplished with the oxygen mask microphone. Both cockpit speakers, phone and interphone function (see VOLUME CONTROLS) will be active. The microphone must be keyed to transmit to the passengers or via a communications radio.

VOLUME CONTROLS

The volume controls consist of four MASTER VOLUME (INPH, PHONE, SPKR and PASS) controls. Each control is rotated to regulate the overall volume level to the applicable output device. The INPH and SPKR controls have a push-ON/push-OFF function. In the "ON" position, the control knob will protrude further than in the "OFF" position. Also, the controls will illuminate in the "ON" position.

INPH Volume — This control regulates the volume level of the crew interphone system. The interphone employs a voice-activated hot microphone.

SPKR Volume — This control regulates the volume level of the on-side cockpit speaker audio.

PHONE Volume — This control regulates the volume level of the on-side headphone audio.

PASS Volume — This control regulates the volume level of the passenger speaker audio.

RADIO MONITOR SWITCHES

Each control has a push-ON/push-OFF function and a volume control which is rotated to regulate the volume level of individual audio inputs. In the "ON" position, the control knob will protrude further than in the "OFF" position. Also, the control will illuminate in the "ON" position. Radio monitor switches on the audio control panel are labeled and perform the following functions:

VHF 1 and VHF 2 Switches — When in the "ON" position, provide audio from the VHF 1 and VHF 2 transceivers respectively.

HF 1 and HF 2 Switches — When in the "ON" position, provide audio from the HF 1 and HF 2 (if installed) transceivers respectively.

NAV 1 and NAV 2 Switches — When in the "ON" position, provide audio from the NAV 1 and NAV 2 receivers respectively.

ADF 1 and ADF 2 Switches — When in the "ON" position, provide audio from the ADF 1 and ADF 2 (if installed) receivers respectively.

DME 1 and DME 2 Switches — When in the "ON" position, provide audio from the DME 1 and DME 2 transceivers respectively.

MKR 1 and MKR 2 Switches — When in the "ON" position, provide audio from the MKR 1 and MKR 2 receivers respectively.

BOTH/VOICE/IDENT SWITCH

This switch controls the audio filtering for the NAV and ADF receivers.

BOTH Position — When the switch is in this position, both the station identifier and voice transmissions will be heard. The BOTH position is the normal position.

VOICE Position — When the switch is in this position, only the voice transmissions will be heard.

IDENT Position — When the switch is in this position, only the station identifier will be heard.

MARKER BEACON HI/LO SWITCH

The HI/LO switch on the pilot's audio control panel controls the #1 marker beacon receiver and the HI/LO switch on the copilot's audio control panel controls the #2 marker beacon receiver.

HI Position — When the switch is in this position, the marker beacon receiver sensitivity is increased.

LO Position — When the switch is in this position, the marker beacon receiver sensitivity is decreased.

AUDIO CONTROL — FLIGHT OPERATION

1. Applicable MASTER VOLUME Controls — Set to the "ON" position and rotate to a comfortable listening level.
2. Applicable Radio Monitor Switches — Set to the "ON" position and rotate to a comfortable listening level. The VHF 1 and VHF 2 volume controls do not affect sidetone levels. The HF 1 and HF 2 volume controls will affect the sidetone level on most models since audio and sidetone utilize a common line from the transceivers. Some HF transceivers do not have sidetone capabilities.
3. MIC SELECT Switch — Rotate to desired position.

CABIN BRIEFING SYSTEM

Either the standard briefing system (Heads-Up Technology Cabin Briefing System), or one of the optional systems (CD-2000 Cabin Briefing System, Airshow 400 Cabin Video Information System or UniVision System) is installed. Each cabin briefing system is designed to give passengers a recorded briefing for various phases of flight.

HEADS-UP TECHNOLOGY CABIN BRIEFING SYSTEM

The Heads-Up Technology cabin briefing system consists of a computer, a control panel, and associated aircraft wiring. Power for the system is 28 VDC supplied through the 2-amp PASS INFO circuit breaker on the copilot's circuit breaker panel.

Cabin Briefing System Control Panel

The cabin briefing system control panel located in the pedestal is used to initiate recorded passenger briefings and determine the status of the system. The control panel consists of the message selector knob, the SEND/CANCEL button and a status light. When the system is powered up, the computer performs a self-test. During the self-test, the green status light will illuminate steady until the test is complete. If the status light illuminates and then begins to flash, the self-test has not been successful. The message selector knob has five message positions. "Takeoff", "Landing", "Turbulence", "Option" and "Autobrief". The "Autobrief" function requires optional equipment and will be inoperative in some airplanes. Once the desired message has been selected by rotating the message selector knob, depressing the SEND/CANCEL button will initiate the briefing. The status light will illuminate steady during the briefing and extinguish when the message is complete. To repeat a message other than "Turbulence", the message selector knob must be rotated to another position, returned to the desired message and the SEND/CANCEL button depressed. The "Turbulence" message can be repeated simply by depressing the SEND/CANCEL button. To interrupt the briefing, depress the SEND/CANCEL button while the message is in progress. Depressing the SEND/CANCEL button again will restart the message at the beginning of the sentence that was interrupted. Actuation of the NO SMOKING/FASTEN SEAT BELT (tone generator chime) switch or the use of the pilot or copilot P.A. microphone will override the cabin briefer. After a slight delay following the interruption, the briefing will continue from the beginning of the sentence at which it was interrupted.

CD-2000 CABIN BRIEFING SYSTEM (OPTIONAL)

An optional CD-2000 Cabin Briefing System may be installed. Customized briefings may be initiated by either pilot using the Cockpit Control Unit (CCU), if installed, or properly programmed FMS. The system consists of a cabin display computer (CDC), one or more flat panel display(s) (FPD), cockpit control unit (CCU) (optional), and associated aircraft wiring. Power for the system is 28 VDC supplied through the 7.5-amp VIDEO circuit breaker on the pilot's circuit breaker panel and the 3.0-amp PASS INFO circuit breaker on the copilot's circuit breaker panel.

The CD-2000 system stores pre-recorded cabin briefings on a flash memory card within the CDC. Up to six separate messages may be programmed with a total storage audio briefing memory of approximately 6 minutes. The length of any one message is limited only by the total audio storage time available. Each audio briefing may be accompanied by a single text or graphic display to be viewed on the cabin flat panel display(s). Briefing graphics are displayed for the duration of their linked recorded audio briefing. The cabin NO SMOKING/FASTEN SEAT BELT sign may also be programmed for display in the upper right corner of the cabin FPD(s) with or without a chime.

The cabin briefing system cockpit control unit (CCU), if installed, is located on the pedestal and is used to initiate recorded passenger briefings. The CCU has a single detent rotary switch labeled SELECT, two push button switches labeled CANCEL and ENTER and an eight character LED display window. The FMS can be configured to control the passenger briefing messages in place of the CCU.

Keying the passenger address or passenger briefing system will automatically override any cabin stereo channel, including overhead speakers that may have been turned off by the cabin control switch panel. The passenger briefing system will be muted if the passenger address system is keyed. Passenger address and passenger briefings are transmitted over cabin speakers and headphone jacks.

Briefings and messages are activated as follows:

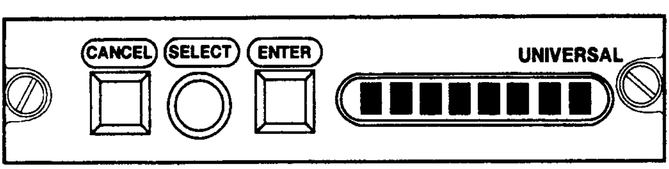
1. Rotate the SELECT knob either direction until the desired briefing or message title appears in the eight character LED display window.
2. Press the ENTER button once to activate the cabin briefing or message. The LED display will flash while the briefing is playing and become steady once the briefing is completed. Avoid pressing ENTER more than once. Doing so will start the briefing, stop it, then begin again from the beginning.
3. The briefing or message may be interrupted at any time by pressing the CANCEL button. Pressing the ENTER button will resume the message. Briefings may also be cancelled when the cabin PA or NO SMOKING/FASTEN SEAT BELT (tone generator chime) is keyed.

Updating estimated time of arrival may be accomplished through the CCU or the FMS. Once an ETA update is accomplished on the CCU, FMS ETA data will no longer be displayed.

Update ETA as follows:

1. Rotate the SELECT knob either direction until ETA appears in the eight character LED display window.
2. Press the ENTER button. The ETA display will flash.
3. Rotate the SELECT knob either direction until the desired ETA is displayed.
4. Press the ENTER button. The new ETA will stop flashing.

For complete details and operating instructions, refer to the "CD-2000 Cabin Display Manual".



CD-2000 Cockpit Control Unit (CCU)
Figure 5-12

AIRSHOW 400 CABIN VIDEO INFORMATION SYSTEM

An optional Airshow 400 Cabin Video Information System may be installed. The system includes a serial mouse, video monitor and an optional cockpit controller. The Airshow 400 system is selected for display by a membrane switch located on the forward right hand cabinet, near the video monitor. This switch is normally labeled ASHW/VCR. An additional switch is located in the passenger armrest.

The passenger briefing feature consists of three messages, (TAKEOFF, LANDING and TURBULENCE). To access these briefings, scroll through the menu and select Time To Destination (TTD), select SEL BRF from the sub-menu if using the optional cockpit controller, or by selecting SEL BRF from the INFO MENU if using the serial mouse. After selecting the desired briefing, the message will be heard through the overhead cabin speakers and in each passenger headphone. The briefing will override any other audio source except for paging. To cancel a briefing scroll to CANCEL or reselect the same briefing.

UNIVISION SYSTEM

An optional UniVision system from UASC may be installed. The cockpit control unit allows the crew to initialize and cancel UniVision stored messages and briefings. The standard passenger briefings consist of three messages (TAKEOFF, LANDING and TURBULENCE). The system is able to access up to sixty four separate safety briefings. Briefing content is user supplied, however, UniVision supports audio and/or graphics content for each briefing. "No Smoking" and "Fasten Seatbelt" is presented as an animated graphic in a small pane on the cabin monitor.

Briefings and messages are stored in the UniVision host computer and are activated by the crew in the following manner. Rotate the SELECT knob (either direction) until the desired briefing or message title appears in the eight character LED display window. Press the ENTER button once to activate the cabin briefing or message. The LED display will flash while the briefing is playing and becomes steady once the briefing is completed.

NOTE Avoid pressing ENTER more than once. Doing so will start the briefing, stop it, and cause it to begin again.

The briefing or message may be interrupted at any time by pressing the CANCEL button. The audio portion of a briefing will also be canceled when the cabin PA is keyed.

NAVIGATION

The navigation system includes the radios and controls used for VOR/ILS navigation, DME, ADF navigation, ATC transponder operation and radio altitude measurement. Tuning of all these functions except the radio altimeter is accomplished via the Radio Tuning Units (RTU) on the center instrument panel or via the Control Display Units (CDU) in the pedestal. The design of the system though is such that all navigation radio management functions are channeled through the RTUs regardless of their origin. The left RTU normally tunes NAV 1, ADF 1, ATC 1, etc. and the right RTU normally tunes the #2 radios. If an RTU fails, the remaining RTU is capable of tuning both #1 and #2 systems. Power for the RTUs is 28 VDC supplied through the 1-amp RTU 1 and RTU 2 circuit breakers on the pilot's and copilot's circuit breaker panels. RTU 1 will be operative during EMER BUS operations. The radio altimeter will be discussed later.

Navigation information is presented in a general manner and is intended for familiarization only. For a detailed description and operation of the navigation system refer to "Collins Pro Line 4 Avionics System For The Learjet 60" Pilot's Guide (P/N 523-0777003).

VHF NAVIGATION

Dual VHF navigation receivers and controls are installed to provide the crew with VOR bearing, VOR audio, localizer deviation, glideslope deviation, marker beacon passage identification and marker beacon audio. The receivers are capable of tuning the entire navigation and glideslope frequency range. The 5-amp NAV 1 and NAV 2 circuit breakers on the pilot's and copilot's circuit breaker panels supply 28 VDC to power the VHF navigation receivers. NAV 1 will be powered during EMER BUS operations.

MARKER BEACON DISPLAY

Marker beacon passage, displayed on the PFD, is indicated by a cyan box with "OM" for outer marker, a yellow box with "MM" for middle marker, or white empty box for inner marker. Passage of any marker beacon is also annunciated by a small empty box on the SDU. All marker beacon annunciations flash when they are displayed.

DISTANCE MEASURING EQUIPMENT (DME)

Dual DME transceivers are installed to provide distance, time-to-station, ground speed, and station ident information for use by other units in the avionics system. Each DME can track as many as three stations at the same time. Channel 1 of each DME is paired with a VOR frequency and tuned via the RTU or CDU for direct display by the crew. Channels 2 and 3 are used by the Flight Management System for multisensor navigation and are automatically tuned by the FMS. DME Hold can be activated on the RTU to "hold" the current DME frequency and allow the navigation receiver to be independently retuned. 28 VDC power for the DME receivers is supplied by the 3-amp DME 1 and DME 2 circuit breakers on the pilot's and copilot's circuit breaker panels.

AUTOMATIC DIRECTION FINDING (ADF)

An ADF system is installed to provide aural reception of signals from a selected ground station and indicate relative bearing to that station. The system operates in the normal ADF frequency range and is tuned via the RTU or CDU for direct display by the crew. Functions such as BFO ON or OFF are controlled by the RTU. The 2-amp ADF 1 circuit breaker is located on the pilot's circuit breaker panel to supply 28 VDC to the ADF receiver. ADF 1 will be operative during EMER BUS operations.

ATC TRANSPONDERS

Dual transponders (Mode C or Mode S) are installed to provide identification and altitude reporting for the air traffic control radar beacon system. The transponders provide selectable altitude reporting and 4096 code selections. Code selection may be accomplished from the RTU or CDU. Other functions such as the selection of STBY mode, ID (ident) and turning off and on altitude reporting are controlled by the RTU. Power for the transponders is 28 VDC supplied by the 3-amp ATC 1 and ATC 2 circuit breakers on the pilot's and copilot's circuit breaker panels. Identification and altitude reporting will be provided by ATC 1 during EMER BUS operations. Mode S transponders are required if TCAS is installed.

RADIO ALTIMETER

A radio altimeter is installed to give the pilot and copilot a direct radio height measurement from 0 to 2,500 feet AGL. The radio altitude is automatically displayed in green digits on both PFDs when the radio altitude is below 2,500 feet AGL. Changes in altitude are displayed by the radio altimeter in 50-foot increments when the altitude is above 1,000 and in 10-foot increments when the altitude is below 1,000 feet. No tuning is required and there are no operating controls that affect the radio altimeter. A self-test function can be initiated by depressing the RA TEST button on either the pilot's or copilot's Altitude Awareness Panel (AAP). During the test a fixed value of 50 feet will be displayed on both PFDs. The DH annunciator will illuminate during the test if the decision height is set higher than 50 feet. The 2-amp RADIO ALT circuit breaker on the pilot's circuit breaker panel supplies 28 VDC power to the radio altimeter.

FLIGHT CONTROL SYSTEM (FCS)

The FCS provides 3-axis autopilot/yaw damper, dual flight director, rudder boost and automatic pitch trim functions. The FCS contains two flight control computers and three primary servos and is controlled by a glareshield-mounted Flight Control Panel (FCP). Each side of the dual system (pilot and copilot) operates the same and both work together to drive the servos and the pitch trim system.

The following information is presented in a general manner and is intended for familiarization only. Refer to "Collins Pro Line 4 Avionics System For The Learjet 60" Pilot's Guide (P/N 523-0777003) and the FAA Approved Airplane Flight Manual for further information on the Flight Control System

AUTOPILOT/FLIGHT DIRECTOR SYSTEM

The autopilot/flight director system provides automatic flight control and guidance for climb, cruise, descent and approach. The system provides dual channel flight guidance, and either channel can be coupled to the autopilot. Mode selection and annunciation for each flight guidance channel and engage controls for autopilot and yaw damper are provided through the glareshield-mounted FCP. Mode and system status annunciation is also provided on the appropriate cockpit displays.

The system provides dual-channel flight guidance in the pitch and roll axis. Dual-channel yaw axis outputs are used for yaw damping. Pitch and roll axis change, when commanded by the autopilot, is affected through autopilot elevator and aileron servos. The autopilot also provides pitch trim commands to the secondary trim system motor of the horizontal stabilizer pitch trim actuator. Autopilot pitch authority is limited to 10° nose down and 20° nose up and roll authority is limited to 32° for lateral command, 27° bank for heading or course capture, and 15° for course tracking and roll rate is limited to 5° per second. Pilot inputs to the autopilot/flight director system are accomplished through the FCP, control wheel switches and the course heading panels. The pilot's flight guidance system operates on 28 VDC supplied through the 2-amp AP 1 and the 3-amp FD 1 circuit breakers on the pilot's circuit breaker panel. The copilot's flight guidance system operates on 28 VDC supplied through the 2-amp AP 2 and the 3-amp FD 2 circuit breakers on the copilot's circuit breaker panel. The autopilot system operates on 28 VDC supplied through the 2-amp AP 1 and AP 2 circuit breakers.

The autopilot/flight guidance system is active whenever power is on the aircraft and both avionics master switches are on. The autopilot may be coupled to either the pilot's or copilot's flight guidance channel using the AP XFR and AP ENG switches on the FCP. When the autopilot is engaged, the associated or on-side PFD will display steering information from the on-side flight guidance channel. Whenever the autopilot is engaged, the on-side PFD command bars will display the steering command and the on-side instruments may be used to monitor autopilot performance. When the autopilot is not engaged, the PFD attitude display can be used to manually fly the airplane in response to steering commands from the on-side flight guidance channel (provided a vertical or lateral mode is selected).

FLIGHT CONTROL PANEL (FCP)

Autopilot/flight guidance mode selection and autopilot engagement functions are accomplished through the glareshield-mounted FCP. The controller contains three groupings of buttons. The center grouping provides the autopilot selection and engage buttons as well as autopilot status annunciators. The grouping on the left provides mode selection for the pilot's flight guidance channel and the grouping on the right provides mode selection for the copilot's flight guidance channel.

SELF-TEST

The system initiates a self-test sequence when the system is powered up (LEFT and RIGHT AVIONICS MASTER Switches ON). If the self-test sequence is not successfully completed, the autopilot will not engage and an "FD" flag will be displayed on the PFDs.

AUTOPILOT ENGAGE FUNCTIONS

AP XFR — The AP XFR is a momentary push-on/push-off button which is used to select the flight guidance channel to be coupled with the autopilot. A green triangle, on the FCP, will illuminate and point to the side which will couple to the autopilot, when engaged.

AP — The AP button is a momentary push-on/push-off button which is used to couple the autopilot to the selected flight guidance channel. If the autopilot passed the power-up self-test, the autopilot will engage and the green light will illuminate and a green AP ◄ or AP ► (as appropriate) annunciation will appear on the primary flight displays. An electrical interlock in the FCP automatically engages the yaw damper whenever the autopilot is engaged. Thereafter, the yaw damper may be independently disengaged.

YD — The YD button is a momentary push-on/push-off button which is used to engage the yaw damper. When engaged, the indicator above the YD button illuminates. The yaw damper can be disengaged by depressing the YD button a second time or by depressing the Control Wheel Master (MSW) switch.

TURB — The TURB button is a momentary push-on/push-off button which is used to select the autopilot turbulence mode. When TURB is selected, the autopilot will provide softer responses in the pitch and roll axis for flying through turbulence. TURB is not available during flight director only operation and is locked out in APPR mode.

AUTOPILOT/FLIGHT GUIDANCE MODE SELECTION

All mode selection buttons are the momentary push-on/push-off type. A light above the mode selector button will illuminate if all conditions for the mode are satisfied. Any selected mode can be cancelled by selecting an incompatible mode, depressing the mode selector button a second time, or depressing the FD CLEAR button (flight director only). Mode selection and operation is identical for the left and right channels.

Attitude Hold — When the flight director is operating and no vertical mode is selected, pitch attitude hold will automatically be active. When the flight director is operating and no lateral mode is selected, roll attitude hold will automatically be active. Although active, the roll attitude hold cannot be entered without the autopilot first being engaged in the roll mode and then disconnected. These modes are used to maintain a reference pitch and bank angle. The reference angles may be established by manually flying the aircraft to the desired pitch and bank angle and depressing the SYNC button (on the control wheel). When the SYNC button is released, the flight director will generate commands to maintain the existing pitch and roll attitude. If the bank angle is less than 5°, the flight director will command heading hold. The reference values may be changed using the vertical and lateral command function of the control wheel trim switches.

HDG (heading) — When HDG is selected, autopilot/flight director commands are generated to maneuver the airplane as necessary to fly a heading by position of the heading "bug" on the PFD.

1/2 BANK — When 1/2 BANK is selected, the flight director reduces its maximum roll attitude command to one-half of the normal limit. 1/2 BANK may be engaged in conjunction with any lateral mode except Approach. 1/2 BANK is automatically selected when the airplane's pressure altitude is at or above 41,500 feet. 1/2 BANK automatically clears when the airplane descends below this altitude.

NAV (navigation) — The NAV mode provides flight director commands to capture and track the navigational course selected on the PFD.

APPR (approach) — The APPR mode provides flight director commands to capture and track the navigational course selected on the PFD with approach accuracy. During ILS approaches, commands to capture and track the glideslope will be generated after the localizer has been captured.

ALTS (altitude select) — The ALTS mode provides flight director commands to track the selected altitude displayed above the altitude tape on the PFD.

ALT (altitude hold) — The ALT mode provides flight director commands to track the indicated altitude present at the time of mode engagement.

LVL CHG (level change) — The LVL CHG mode provides flight director commands to maneuver the airplane on a customized level change profile toward the preselected altitude. If the airplane's altitude is below the preselect altitude, commands will be generated to climb to and capture that altitude. If the airplane's altitude is above the preselect altitude, commands will be generated to descend to and capture that altitude.

VS (vertical speed hold) — The VS mode provides flight director commands to maintain the vertical speed selected on the air data reference panel (ARP). In the absence of a preselected vertical speed, flight director commands will be generated to maintain the vertical speed present at the time of engagement.

SPD (speed hold) — The SPD mode provides flight director commands to maintain the existing airspeed (IAS or Mach) when the mode is selected. The speed hold reference value can be changed by rotating the IAS knob on the air data reference panel (ARP). SPD will automatically engage if a significant overspeed occurs.

VNAV (vertical navigation) — VNAV allows the pilot to program the FMS to provide vertical guidance in descent planning or to meet altitude crossing restrictions. VNAV is enabled for aircraft equipped with dual FMS. With dual UASC FMS, VNAV for enroute, terminal, and approach is approved. With dual Collins FMS, VNAV for enroute only is approved.

Go-Around — The go-around (GA) mode is a flight director only mode and is selected by depressing the GO-AROUND button in the left thrust lever knob. When GA is selected, the autopilot will disengage, selected lateral and vertical modes will be cancelled, and a fixed 9° nose-up, heading hold steering command will be presented on the PFD.

FCP ANNUNCIATORS

The FCP incorporates annunciators to provide the status of the rudder boost and automatic pitch trim systems and an annunciator to indicate which flight director is selected.

TRIM (pitch trim) — The red TRIM annunciator will illuminate when an automatic pitch trim failure has been detected. The autopilot cannot be engaged while the red TRIM light is illuminated. If already engaged and the light illuminated, the autopilot will remain engaged until manually disengaged.

RB (rudder boost) — Two separate RB annunciators, one green and one amber, are installed. Illumination of the green RB annunciator indicates the rudder boost system is active. Illumination of the amber RB annunciator indicates a rudder boost system failure or that the RUDDER BOOST switch is off.

LEFT & RIGHT ARROWS (autopilot transfer arrows) — The left or right arrow illuminates to indicate which flight director is selected. When the autopilot is engaged, the arrow points to the coupled flight director. Both arrows are green.

CONTROL WHEEL MASTER SWITCHES — AUTOPILOT FUNCTION

The Control Wheel Master Switches (MSW), located on the outboard horn of the pilot's and copilot's control wheels, may be used to disengage the autopilot. Depressing either the pilot's or copilot's MSW will disengage the autopilot. When the autopilot disengages, the green light above the AP button on the FCP will extinguish and the autopilot disengage tone will sound. For a pilot initiated autopilot disconnect, the AP annunciation flashes amber for 5 seconds, then self-clears. If a monitored disengagement occurs, the autopilot engage message flashes amber and will clear only when the AP or MSW button is pressed, or the autopilot is re-engaged. When the autopilot is disengaged using the MSW, the flight director will remain active and will display steering information from the flight guidance computer, if a vertical or lateral mode is selected.

PITCH TRIM SELECTOR SWITCH — AUTOPILOT FUNCTION

When the autopilot is engaged, the autopilot maintains aircraft pitch trim through the secondary motor of the horizontal stabilizer pitch trim actuator if the PITCH TRIM selector switch on the pedestal is in the PRI or SEC position. The autopilot will not engage or will disengage if the PITCH TRIM selector switch is moved to the OFF position.

CONTROL WHEEL TRIM SWITCHES — AUTOPILOT/FLIGHT DIRECTOR FUNCTION

When either Control Wheel Trim switch (arming button depressed) is moved to any of the four positions (LWD, RWD, NOSE UP or NOSE DN), an aircraft trim input is made and the autopilot will disengage. If the arming button is not depressed, the on-side switch may be used to input lateral commands (LWD and RWD) and vertical commands (NOSE UP and NOSE DN) to the autopilot. Using this feature causes active modes (except GS) in the applicable axis to disengage and revert to the attitude hold mode. Armed modes are not effected. The control wheel trim switch has no effect on the flight director.

PEDESTAL NOSE DN-OFF-NOSE UP SWITCH — AUTOPILOT FUNCTION

The NOSE DN-OFF-NOSE UP switch, located on the pedestal trim control panel, may be used to disengage the autopilot or to make trim adjustments with the autopilot pitch and roll axes inhibited. With the PITCH TRIM selector switch in the SEC position, actuation of secondary pitch trim through the NOSE DN-OFF-NOSE UP switch will disengage the autopilot, extinguish the green light above the AP button, and sound the autopilot disengage tone. When the autopilot is disengaged through the NOSE DN-OFF-NOSE UP switch, the flight director will remain active and will display steering information from the flight guidance computer.

SYNC SWITCHES

The SYNC switches in the control wheels are normally used with the on-side flight director to change a vertical mode (except GS, LVL CHG and ALTS) reference values without reselecting the mode. The only lateral mode in which SYNC switches are active is roll attitude hold (ROLL).

FD CLEAR SWITCHES

The FD CLEAR switches are used to remove the V-bars and cancel any selected vertical or lateral mode from the on-side flight director. FD CLEAR has no effect if the autopilot is coupled to the on-side flight director.

YAW DAMPER SYSTEM

The yaw damper augments aircraft stability by opposing uncommanded motion about the yaw axis and provides turn coordination. The yaw damper is provided by the yaw axis of the autopilot/flight guidance system. The yaw damper operates independent of the autopilot.

YAW DAMPER CONTROL

The yaw damper button and annunciator are located on the FCP. The yaw damper engages when the autopilot is engaged, or by depressing the YD button on the FCP. When the yaw damper is engaged, the green light above the YD button will be illuminated. If the yaw damper is already engaged, depressing the YD button will disengage the yaw damper.

CONTROL WHEEL MASTER SWITCHES - YAW DAMPER FUNCTION

The Control Wheel Master Switches (MSW), located on the outboard horn of the pilot's and copilot's control wheels, may be used to disengage the yaw damper. Depressing either the pilot's or copilot's Control Wheel Master Switch (MSW) will disengage the yaw damper. When the yaw damper is disengaged through pilot action, the yaw damper disengage tone will sound, and an amber YD annunciator on the EFIS will flash for 5 seconds, then extinguish. The green indicator light above the YD button on the FCP will also extinguish.

RUDDER BOOST SYSTEM

The rudder boost system is installed to provide reduced rudder pedal force, increased directional control effectiveness and improved takeoff performance. With the rudder boost on, minimum control speed-ground (VMCG), takeoff speeds and distances are all lower. Rudder boost is a function of the autopilot. In addition to the autopilot, the system consists of a yaw force interface box, force sensors, flap position switch, RUDDER BOOST Switch, and associated aircraft wiring. The yaw damper servo provides the "boost" to assist the pilot in moving the rudder in the desired direction. The rudder boost system is supplied 28 VDC through the 3-amp FD 1 circuit breaker on the pilot's circuit breaker panel.

Normally the RUDDER BOOST Switch, on the pilot's switch panel, is left on at all times. With flaps lowered more than 3°, applying approximately 50 pounds of force to either rudder pedal will cause the yaw servo to automatically engage and apply force to the rudder in the same direction as the pilot. As pilot input force is increased, the servo force will also increase up to the maximum yaw servo force. When the rudder boost engages, the green RB annunciator, on the FCP, illuminates to indicate rudder boost is active. If the yaw damper is on when the rudder boost engages, the system will make a smooth transition from yaw damper to rudder boost. A failure of the system is indicated by illumination of the amber RB annunciator on the FCP. Self-test of the system is initiated during system power-up.

RUDDER BOOST SWITCH

Arming of the rudder boost system is controlled by the RUDDER BOOST Switch located on the pilot's switch panel. When the switch is set to ON, the system will be armed. Setting the switch to OFF will disarm the system and the amber RB annunciator, on the FCP, will illuminate.

FLIGHT MANAGEMENT SYSTEM (FMS)

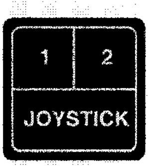
The Learjet 60 may be equipped with a dual Universal Avionics Systems Corporation (UASC), a dual Collins, or a single Collins flight management system. The FMS is an integrated navigation management system that provides the pilot with centralized control for the airplane's navigation sensors, computer based flight planning, and fuel management.

The FMS provides worldwide point-to-point and great circle navigation. The system uses a combination of DME, VOR/DME, single or dual VLF/Omega, single or dual GPS, and DR (dead reckoning) to determine the best estimate of present position. VOR and multiple channel DME are the primary navigation sensors in the FMS. The FMS contains a subscription data base which has the appropriate navaids and airports. When operating with all navigation data available, the FMS scans for DME signals which, according to its data base present position, are expected to be received. The outputs of the two DMEs are multiplexed into three channels for each DME allowing up to six DMEs to be scanned. As navigation station signals are received, their Morse code identifiers are decoded for station verification. If at least three properly positioned DME signals are received, the airplane position can be determined. When less than three DMEs are available, then VOR bearing, VLF/Omega, GPS, and DR data are used as necessary to provide the most accurate position fix possible. In addition to the navigational inputs, the system also receives true airspeed and altitude information from an air data computer and fuel flow data from the fuel flow sensors.

Flight management capabilities include VFR/IFR RNAV operation, direct-to functions, VNAV, approach, and fuel management.

The following two switch/annunciators are located on the pedestal and are used with the FMS.

This switch is used when a checklist is displayed on the MFD. Pressing the LINE ADV switch acknowledges the cursored line and advances it down one line on the page. This switch also advances the cursored line on the MFD (pilot's or copilot's) as selected by the JOYSTICK 1/2 switch.



This switch connects the joystick to either the #1 (left) or #2 (right) MFD. The joystick is never connected to both MFDs at once. Press the JOYSTICK select switch to connect the joystick to one of the MFDs. The 1 (left) or 2 (right) annunciator illuminates to show the selected MFD.

The fuel management function of the FMS allows the pilot to plan fuel requirements while on the ground. Pilot-supplied data and inputs from the airplane's fuel flow sensors give the FMS the necessary information to calculate and display significant real-time fuel management information throughout the flight.

For a detailed description and operation of the FMS, refer to the "Collins Pro Line 4 Avionics System For The Learjet 60" Pilot's Guide (P/N 523-0777003), or the UASC Operator's Manual as appropriate.

WEATHER RADAR

A weather radar system is installed to give the pilot a pictorial representation of the safest possible flight path during adverse weather conditions. The single unit X-Band weather radar provides data from atmospheric moisture and ground features. The resulting radar "pictures" are displayed on the MFDs. Terrain mapping is possible with the radar, and with practice, the pilot will be able to identify coastlines, large rivers and lakes, mountainous areas and cities. As the radar system becomes more familiar, it may be used to verify position, track, ground speed, altitude and attitude as well as for weather avoidance. The radar can be operated in a split mode or sync mode. In the split mode, both pilots have the option of placing the radar in different mode and range settings on alternate sweeps. This gives the appearance of two independent radars. In the sync mode, both sides show the same radar display. Some installations include the capability to detect precipitation related turbulence.

Control of the weather radar is accomplished from the associated Control Display Unit (CDU) in the pedestal. Primary stabilization for the radar is obtained from the left Attitude Heading System (AHS). Radar stabilization is automatically obtained from the right AHS if the left AHS fails.

For a detailed description and operation of the weather radar system refer to "Collins Pro Line 4 Avionics System For The Learjet 60" Pilot's Guide (P/N 523-0777003).

MISCELLANEOUS

COCKPIT VOICE RECORDER (CVR)

A cockpit voice recording system is installed to record all cockpit voice, radio communication, aural annunciation, and aural navigation signals for the last 30 minutes of recorded operation. System components consist of a CVR TEST switch, a CVR ERASE switch, a headphone jack, a microphone and a voice recorder unit.

The CVR TEST switch, CVR ERASE switch and headphone jack are installed on the pedestal.

The area microphone, installed in the center of the instrument panel, picks up all cockpit audio. The microphone incorporates electronic background noise suppression.

The voice recorder unit contains a converter that converts audio input to digital format. The digital format audio is stored in a crash-survivable solid-state memory. The digital storage unit has a maximum recording interval of 30 minutes. After 30 minutes of continuous recording, the recorder automatically starts recording over the previously stored audio data.

Squat switch, parking brake and anti-skid ON interlock switching control the bulk erasure function.

Voice recorder system power is 28 VDC supplied through the 3-amp CVR circuit breaker on the copilot's circuit breaker panel. The CVR will be operative during EMER BUS operations.

FLIGHT DATA RECORDER (FDR)

The flight data recorder will record pertinent flight profile data. A white FDR FAIL annunciator is installed in the warning lights annunciator panel to annunciate system malfunctions. The system is powered by 28 VDC through the 3-amp FDR circuit breaker on the pilot's circuit breaker panel and is powered by the Emergency Bus.

The Flight Data Recorder is functional whenever power is applied to the aircraft. There are no controls or switches associated with the FDR and operation is completely automatic.

Upon power application to the aircraft, the system will perform a self-test. When the BATTERY switches are set to on, the FDR FAIL annunciator will illuminate briefly, then extinguish. The test will continue for another 60 seconds and the light should not come back on during the test.

CLOCKS

Each instrument panel is equipped with a multi-function chronometer to display GMT, local time (LT), flight time (FT), and elapsed time (ET). Power for the chronometers is 28 VDC supplied through the 1-amp L and R CLOCK circuit breakers on the pilot's and copilot's circuit breaker panels.

The SEL button selects what is to be displayed and the CTL button controls what is being displayed. Pressing SEL sequentially selects GMT, LT, FT or ET for display. FT starts counting when the squat switches transition to the air mode and stops counting when they transition back to ground mode. The CTL button resets FT back to zero when held down for 3 seconds. ET is started and reset when the CTL button is pushed momentarily. Depressing the SEL and CTL buttons simultaneously enters the set mode and GMT or LT can be set. The CTL button is then pressed to increment the flashing digit to the desired value. Pressing the SEL button then enters that value and toggles to the next digit to be set.

HOURMETER-AIRCRAFT (OPTIONAL)

An optional hourmeter may be installed to measure aircraft accumulated time. A typical location for the hourmeter is behind the carpeted access panel on the step behind the cockpit or in the copilot's circuit breaker panel. It is wired to the right squat switch and will measure accumulated time as soon as the aircraft lifts off. The hourmeter receives 28 VDC through the 1-amp HOUR METER circuit breaker on the copilot's circuit breaker panel.

WX1000 STORMSCOPE (OPTIONAL)

The Stormscope system is a passive radar system; that is, it does not transmit energy. Instead, the Stormscope detects electrical discharges (lightning) from convective clouds through passive reception of their energy and displays them as a moving map on a cathode ray tube (CRT). Since the Stormscope system does not plot water droplets like regular weather radar, it is not subject to attenuation. The Stormscope is located in the instrument panel and is coupled to the copilot's attitude/heading computer so that the Stormscope map will automatically reposition thunderstorm information relative to aircraft heading. The Stormscope system includes an antenna, a receiver/processor unit, cathode ray tube (CRT) display, and associated aircraft wiring. The Stormscope receives 28 VDC through the 2-amp STORMSCOPE circuit breaker on the copilot's circuit breaker panel.

CAUTION

The Stormscope should never be used to attempt thunderstorm penetration. Thunderstorm avoidance must not be solely predicated upon the use of the Stormscope.

The following information is meant as a familiarization only to the WX1000 Stormscope system. Refer to the "Stormscope Series II Pilot's Handbook" for additional information and operating instructions.

STORMSCOPE MODES, VIEWS & RANGES

Up to seven modes are available in the Stormscope system: Weather, Main Menu, Checklist Menu, Checklists (customized as desired), Time/Date, Options, and NAVAID (optional with a compatibly installed LORAN or GPS).

Two views available in the weather mode are: 120° forward view and 360° surrounding view. The range selected remains the same between views.

Range displays available on the CRT are 25, 50, 100, or 200 nm. When the Weather mode is initially displayed after power-up, or when entering the Weather mode from another mode, the Stormscope will display the 200 nm range first.

SYSTEM OPERATION

The Stormscope requires a warm-up period of approximately 15 seconds from initial power on during which an automatic self-test is conducted. If the self-test is successful, "ALL TESTS ARE OKAY" will be displayed on the Stormscope CRT for approximately 3 seconds followed by the Main Menu. A manually initiated self-test and a continual self-test capability are included in the system. If the Stormscope should fail any test, an error message will appear on the CRT indicating which test was failed and which functions remain operational. The Stormscope may still operate without the failed function. Results of the automatic self-test, continual self-test, or manual self-test can also be accessed from the OPTIONS mode.

The controls around the Stormscope bezel include an OFF/BRT control knob. The remaining four buttons located around the bottom of the Stormscope vary from mode to mode. The CRT will display a button legend as appropriate for each mode. Unlabeled buttons will have no function in that mode.

WEATHER MAPPING

Displayed electromagnetic discharges associated with thunderstorm activity appear as + signs on the Stormscope CRT. The plus signs are reduced in size as range is increased to reduce clutter. Thunderstorm intensity appear as varying shades of gray; light gray for weak activity to black for severe activity.

The CLEAR button clears the display and memory of weather data. Frequent use of the CLEAR key facilitates verification of thunderstorm data by monitoring plus sign reappearance. Determining the amount and frequency of discharge activity helps in determining the build-up or dissipation of a thunderstorm cell.

Display discharges are removed from the screen after 2 minutes or when the CLEAR key is pressed. When changing from one range display to another, no loss of data will occur since electrical discharge information is acquired and stored on all ranges simultaneously.

EMERGENCY LOCATOR TRANSMITTER (OPTIONAL)

An optional Emergency Locator Transmitter (ELT) may be installed which transmits distress signals assisting rescue personnel in locating a downed aircraft. Several different installations are offered, but each consists of a transmitter, antenna, and remote switch.

TRANSMITTER AND ANTENNA

The transmitter and antenna are installed in the vertical stabilizer. Power for the transmitter is provided by an internal battery. The transmitter will automatically activate under emergency conditions or may be manually activated using the cockpit switch.

REMOTE SWITCH

A remote switch is installed in the cockpit to allow manual activation and resetting of the ELT transmitter without accessing the transmitter itself.

SECTION VI ANTI-ICE & ENVIRONMENTAL

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SECTION VI ANTI-ICE & ENVIRONMENTAL

BLEED AIR SUPPLY

Engine bleed air is used extensively for anti-icing and cabin environmental control. The source of this air is low- and high-pressure ports on each engine compressor. From the engine compressor, the bleed air is mixed and regulated in the mixing/regulating valve mounted on each engine. The bleed air is then ducted from the engines into the tailcone where it is available for several using systems. Shutoff valves and check valves are installed in the tailcone plumbing to control the bleed air from the left and right engines. In addition to the plumbing, the system includes BLEED AIR switches and an overheat warning system.

BLEED AIR SWITCHES

The L and R BLEED AIR switches, located in the BLEED AIR group on the copilot's switch panel, control the respective left and right bleed-air shutoff valves and left and right emergency pressurization valves. Each BLEED AIR switch has three positions: EMER, ON and OFF. When a BLEED AIR switch is in the ON position, the respective bleed-air shutoff valve will open and the emergency pressurization valve will be closed. When a BLEED AIR switch is set to OFF, the respective bleed-air shutoff valve will be energized to the closed position. When a BLEED AIR switch is set to EMER, the respective bleed-air shutoff valve will close and the emergency pressurization valve will be energized open and the high-stage bleed air will be shut off. The bleed-air shutoff valve will close automatically whenever emergency pressurization is activated or the ENG FIRE PULL T-handle is pulled on the respective side. The bleed-air shutoff valves control bleed-air flow to the cabin air distribution and temperature control systems, wing anti-ice system, and windshield anti-ice system. Bleed air for nacelle, engine anti-icing, and windshield alcohol tank pressurization is still available with the shutoff valves closed. The bleed-air shutoff valves and emergency pressurization valves operate on 28 VDC supplied through the 7.5-amp L and R BLEED AIR circuit breakers on the pilot's and copilot's circuit breaker panels.

CABIN AIR LIGHT *(Aircraft 60-271 & subsequent and prior aircraft modified by SB 60-31-1)*

A white CABIN AIR advisory light indicates that either the L BLEED AIR, R BLEED AIR or CAB AIR switches are in the off position.

BLEED AIR WARNING LIGHT

Engine pylon, bleed-air duct, and tailcone overheat indication is provided by the red BLEED AIR L and BLEED AIR R warning lights. Each light is operated by thermoswitches installed in the pylon structure and in the bleed-air ducting. Activation of either thermoswitch will illuminate the associated light. The thermoswitch in the pylon structure will cause the associated light to illuminate if the pylon structure temperature reaches approximately 250°F. The thermoswitch in the pylon bleed-air ducting will cause the associated light to illuminate if the duct temperature reaches approximately 600°F. In addition to the thermoswitches, a tailcone sensing element is installed to detect elevated tailcone temperatures caused by a leak in the bleed-air ducting. If both the BLEED AIR L and BLEED AIR R warning lights illuminate simultaneously, the tailcone overheat sensor has tripped the lights. The lights operate on 28 VDC supplied through the 7.5-amp WARN LTS circuit breakers on the pilot's and copilot's circuit breaker panels. The tailcone overheat detection system operates on 28 VDC supplied through the 2-amp BLEED AIR OV HT circuit breaker on the pilot's circuit breaker panel. Warning lights and tailcone overheat detection is operative during EMER BUS mode.

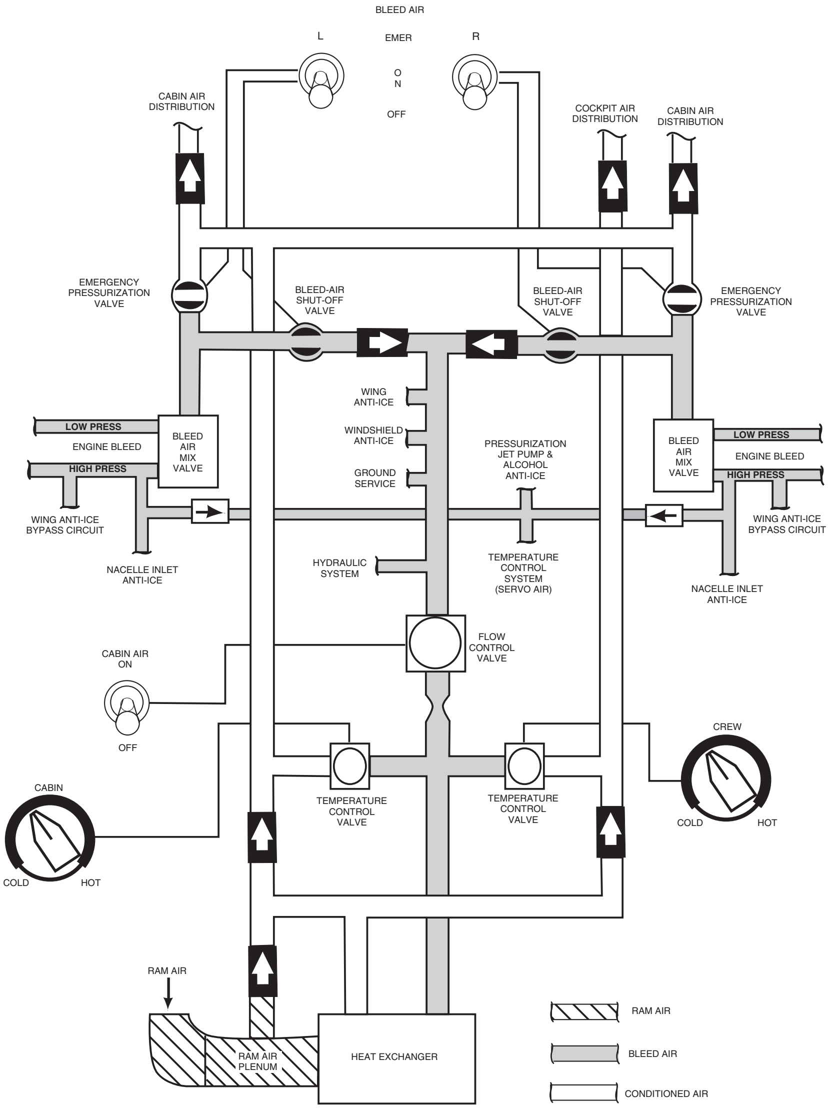
ANTI-ICE SYSTEMS

Aircraft anti-ice protection is provided through the use of electrically heated anti-ice systems, engine bleed-air heated anti-ice systems, and an alcohol anti-ice system. Electrically heated systems include the pitot-static probes, total air temperature probe, engine inlet air temperature/pressure sensors, stall warning vanes, and horizontal stabilizer leading edge. Electrically-heated windshields provide defogging for the windshield interior. Engine bleed air is utilized to provide anti-icing for the wing leading edge, windshield, nacelle inlets, low-pressure compressor inner stator, and engine fan spinners. The alcohol system is installed to provide backup anti-ice protection for the pilot's windshield in event of normal anti-icing system malfunction.

ROSEMOUNT ICE DETECTOR SYSTEM (OPTIONAL)

The optional Rosemount Ice Detector system is installed to detect an icing condition and notifies the pilots by illumination of the amber or white ICE DET lights, in the glareshield annunciator panel, and both Master CAUT lights. A self-test of the Rosemount Ice Detector system is conducted every time aircraft power is turned on, and the ICE DETECTOR circuit breaker is engaged. The ice detector system self-test will show a failed self-test if the amber ICE DET light and both Master CAUT lights are illuminated. The Rosemount Ice Detection System

provides an additional means of ice detection and should not be used as the only source of ice detection. The Rosemount Ice Detector System receives 28 VDC through the 15-amp ICE DETECTOR circuit breaker on the pilot's circuit breaker panel.



BLEED AIR SUPPLY SCHEMATIC
Figure 6-1

When the Rosemount Ice Detector probe detects an icing condition, and the STAB WING HEAT switch is Off, the amber ICE DET light located in the glareshield annunciator panel, and both Master CAUT lights will illuminate. Probe de-icing is done automatically by the Rosemount system itself. Selecting the STAB WING HEAT switch On will inhibit the amber ICE DET light and enable the white ICE DET light. The ICE DET white light is an advisory light which will illuminate only when icing is detected while the STAB WING HEAT switch is On. Illumination of the ICE DET amber light with the STAB WING HEAT switch On indicates a failure of the Rosemount Ice Detection system.

ICE DETECT LIGHTS

Two ice detect lights are installed on the forward glareshield to indicate ice or moisture formation on the windshield during night operations. These lights are illuminated whenever the BATTERY switches are On. When particles of ice or moisture form, light refraction results in the appearance of two red areas, approximately 1-1/2 inches (38 mm) in diameter, on the windshield. The light on the pilot's side is located in a position covered by the windshield anti-ice airstream. The copilot's light is positioned outside the airstream; therefore, the copilot's windshield must be monitored whenever windshield anti-ice system is in operation. The red areas indicate ice encounters when the SAT is below freezing and moisture encounters when the SAT is above freezing. The lights are supplied 28 VDC through the 2-amp L and R ICE DETECT LIGHT circuit breakers on the pilot's and copilot's circuit breaker panels respectively.

WING INSPECTION LIGHT

The wing inspection light, located on the right forward fuselage, may be used to visually inspect the right wing leading edge for ice accumulation during night operations. The light is illuminated by depressing the WING INSP LIGHT momentary switch. This switch may be located on the copilot's switch panel or on the instrument panel adjacent to the pitch trim indicator. The light illuminates a black dot on the outboard wing leading edge to enhance visual detection of ice accumulation. Power is supplied through the 5-amp WING INSP LT circuit breaker on the copilot's circuit breaker panel.

ENGINE AND NACELLE INLET ANTI-ICE

The engine and nacelle inlet anti-ice system provides anti-ice protection for the engine fan spinners, low pressure compressor inner stator, nacelle inlets, and the engine inlet air temperature and pressure sensors. The fan spinners, low pressure compressor inner stator, and nacelle inlets are anti-iced by engine bleed air. The fan spinners are

continually heated by bleed air flowing between their double-wall construction. The low pressure compressor inner stator and nacelle inlet are heated by bleed air when the associated NAC HEAT switch is on. The engine air temperature (TT0) and pressure (PT) sensors are anti-iced by integral electrical heating elements. Each engine anti-ice system is independently operated and consists of TT0/PT sensor heating elements, a nacelle inlet anti-ice control valve (controls flow to the nacelle inlet lip), an engine anti-ice control valve (controls flow to the low-pressure compressor inner stator), a pressure switch, a control switch, a NAC HT light, and associated aircraft wiring and bleed-air plumbing. Control circuits are powered by 28 VDC supplied through the 7.5-amp L and R NAC HEAT circuit breakers on the pilot's and copilot's circuit breaker-panels respectively.

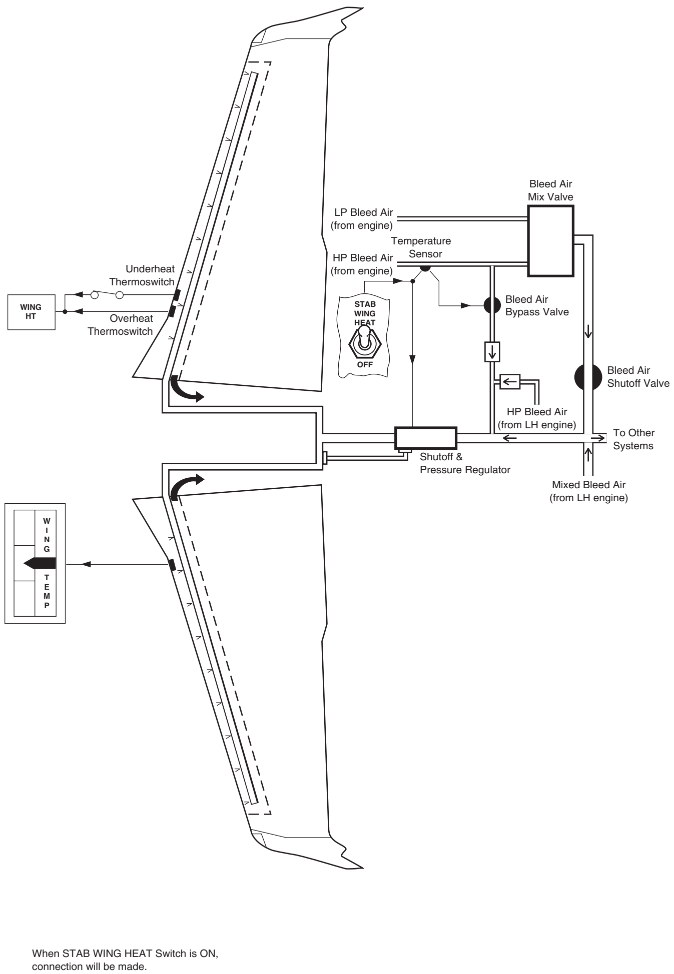
NAC HEAT SWITCHES

The left and right engine and nacelle inlet anti-ice systems are independently controlled through the NAC HEAT switches in the ANTI-ICE group on the center switch panel. Each NAC HEAT switch has two positions: On (L or R) and OFF. When a NAC HEAT switch is placed in the On (L or R) position, the associated TT0/PT sensor elements will be energized and the associated engine and nacelle inlet anti-ice control valves will open. Engine bleed air will flow through the open valves to the low pressure compressor inner stator and nacelle inlet lip. Since the control valves are energized closed, engine and nacelle inlet anti-ice protection will still be available in the event of an electrical system failure.

NAC HT LIGHTS

The amber L and R NAC HT lights on the glareshield annunciator panel provide the crew with visual indication of an engine or nacelle inlet anti-ice system malfunction. The lights are operated by a pressure switch in the associated nacelle inlet bleed air plumbing and a proximity switch built into the engine anti-ice control valve. Illumination of a NAC HT light when the associated NAC HEAT switch is in the On position, indicates that insufficient pressure is being applied to the nacelle inlet or the engine anti-ice control valve has failed to open. Illumination of a NAC HT light, when the associated NAC HEAT switch is in the OFF position, indicates that bleed-air pressure is being applied to the nacelle anti-ice system due to a malfunction of the nacelle anti-ice control valve.

The green NAC HT light on the glareshield annunciator panel provides the crew with visual indication that either nacelle heat switch is On.



WING ANTI-ICE SYSTEM
Figure 6-2

WING ANTI-ICE

The wing anti-ice system utilizes engine bleed air directed through diffuser tubes in each wing leading edge. The heated air is distributed to the wing root and leading edge and then allowed to exit into the center wing/wheel well area. The system consists of wing diffuser tubes, a WING HT caution light, two thermoswitches (one underheat sensor and one overheat sensor), a wing temperature sensor, an anti-ice shutoff and pressure regulator valve, a bleed air bypass valve on each engine, a

wing temperature indicator, a system switch, and associated aircraft wiring. Electrical power for system operation is 28 VDC supplied through the 3-amp WING HEAT circuit breaker on the copilot's circuit-breaker panel.

STAB WING HEAT SWITCH — WING HEAT FUNCTION

The wing anti-ice system is controlled through the STAB WING HEAT switch located in the ANTI-ICE group on the center switch panel. The switch has two positions: On (STAB WING HEAT) and OFF. When the STAB WING HEAT switch is set On, the anti-ice shutoff and pressure regulator valve control solenoid will close allowing pressure to build within the valve reference chambers. The building pressure will open a butterfly valve in the bleed-air airstream and allow heated air to flow through the ducting into the wing diffuser tubes. The valve will maintain a regulated 15 (±2.5) psi bleed airflow providing the butterfly remains open. In the event of an electrical system failure, the valve will shut off the bleed-air flow and wing anti-ice protection will not be available. Two sources of bleed air are used for wing anti-ice. In addition to the normal bleed-air supply (mixed low- and high-pressure), bypass circuits are activated which makes hotter bleed air from the engines' high pressure ports available for wing anti-icing. A temperature sensor will deactivate the bypass circuit if the respective high-pressure duct becomes too hot. When the STAB WING HEAT switch is set to OFF, the bypass circuits are deactivated. Additionally, the bypass circuit is deactivated if the respective BLEED AIR switch is not ON or the respective ENG FIRE PULL T-handle is pulled.

WING TEMP INDICATOR

The WING TEMP indicator, located on the center switch panel in the ANTI-ICE group, is installed to provide a visual indication of the wing leading edge temperature. The indicator receives input signals from the wing temperature sensor installed on the inner surface of the left wing leading edge. The indicator face is divided into three colored segments: blue, green, and red. If the indicator pointer is in the blue segment, wing leading edge temperature is cold enough for moisture to freeze on the surface. If the indicator pointer is in the green segment, wing leading edge temperature is warm enough that moisture will not freeze on the surface. If the indicator pointer is in the red segment, the wing leading edge is approaching an overheat condition and corrective action must be taken. The wing anti-ice system should be energized whenever flying through visible moisture and the WING TEMP indicator pointer is in the blue segment.

WING HT LIGHT

The amber WING HT light, on the glareshield annunciator panel, will illuminate to indicate the wing anti-ice system is not maintaining the temperature of the leading edge in the normal operating range. In the event that the wing leading edge heats to 215°F (102°C), the overheat thermoswitch located on the inner skin of the right wing leading edge will cause the light to illuminate. If the wing leading edge temperature cools to 55°F (13°C) and the STAB WING HEAT switch is on, the underheat thermoswitch located on inner skin of the right wing leading edge will cause the light to illuminate. The light will illuminate upon initial activation of the wing anti-ice system if the wing temperature is below the set point of the underheat thermoswitch. As the temperature of the wing leading edge rises, the light should extinguish.

HORIZONTAL STABILIZER ANTI-ICE

The horizontal stabilizer anti-ice system utilizes sequenced electrical heating elements along the horizontal stabilizer leading edge. The system consists of an electrically heated blanket bonded to each half of the horizontal stabilizer leading edge, three remote control circuit breakers (RCCB), a heat controller, a caution light, a system switch, and associated aircraft wiring. Control circuits operate on 28 VDC supplied through the 1-amp STAB HEAT circuit breaker on the copilot's circuit breaker panel. Electrical power for the heating elements is 28 VDC supplied through three 50-amp current limiters.

STAB WING HEAT SWITCH — STABILIZER HEAT FUNCTION

The horizontal stabilizer anti-ice system is controlled through the STAB WING HEAT switch located in the ANTI-ICE group on the center switch panel. The switch has two positions: On (STAB WING HEAT) and OFF. When the aircraft is in flight and the STAB WING HEAT switch is On, 28 VDC is supplied through the three RCCBs to the heat controller. The heat controller distributes intermittent electrical power to the individual heating elements in a forward-to-aft sequence of 15 seconds duration each. Approximately 3 minutes are required to complete a full cycle. The center, or parting elements, are supplied with continuous electrical power. At least one engine generator must be operating to enable the heat controller circuits. The controller circuits are biased by starter engaged and weight-on-wheels signals; therefore, the system is inoperative when the squat switch is in the ground mode and during engine start.

STAB HT LIGHT

The amber STAB HT light, located on the glareshield annunciator panel will illuminate when any of the following conditions exist:

On the ground

- STAB HEAT circuit breaker is pulled.
- STAB WING HEAT switch is On.

In flight

- STAB HEAT circuit breaker is pulled.
- The STAB WING HEAT switch is On and any one heating element fails (remaining elements will continue to function normally).

During flight, illumination of the STAB HT light indicates system failure. During ground operation, the STAB HT light should illuminate whenever the STAB WING HEAT switch is On.

STABILIZER HEAT SELF TEST

A self test may be conducted with the aircraft on the ground and a generator on-line. Under these conditions, when the STAB WING HEAT switch is turned on the following events should happen:

1. The STAB HT light will illuminate.
2. The generator load will increase approximately 120 amps total for 2 to 3 seconds and then decrease to the "STAB HEAT off" value.
3. The STAB HT light will remain illuminated indicating the system is functioning normally.

The following events indicate a failure of the system:

1. STAB HT light does not illuminate when STAB WING HEAT switch is turned on. Turn STAB WING HEAT switch off.
2. Load does not decrease within 5 seconds. Turn STAB WING HEAT switch off.
3. STAB HT light flashes approximately 3 times per second. One or more heating elements are not within their operating tolerance (element failure). Turning STAB WING HEAT switch off will cancel the flashing.

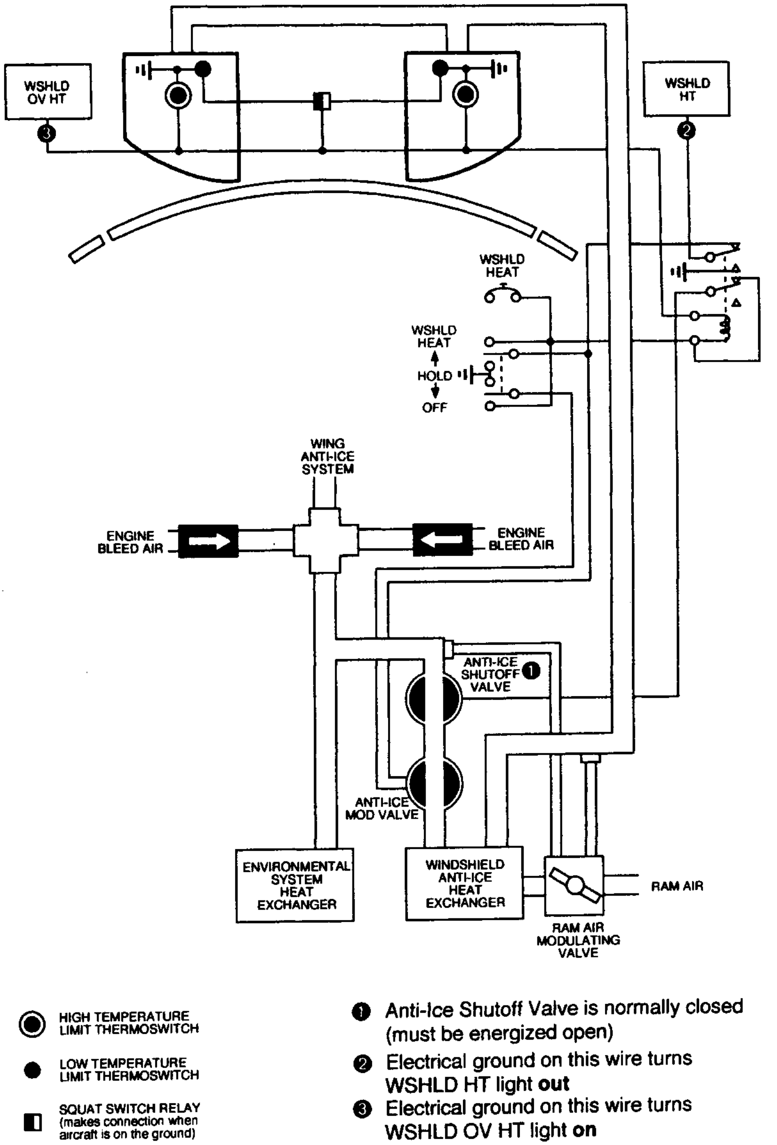
The STAB WING HEAT switch must be off for 3 minutes allowing the system to reset before another self test attempt can be made.

WINDSHIELD ANTI-ICE

Primary windshield anti-icing is accomplished by directing conditioned engine bleed air through ducting and control valves to external outlet nozzles forward of the windshield. The windshield anti-ice system consists of a shutoff valve, an anti-ice modulating valve, two low-limit overheat thermoswitches, two high-limit overheat thermoswitches, a green WSHLD HT light, an amber WSHLD OV HT caution light, a ram air modulating valve, an anti-ice duct temperature sensor, an anti-ice heat exchanger, two outlet nozzle assemblies, a system control switch, and associated aircraft wiring and bleed-air ducting. Electrical power to the control circuits is 28 VDC supplied through the 7.5-amp WSHLD HEAT circuit breaker on the copilot's circuit breaker panel.

WSHLD HEAT SWITCH

The windshield anti-ice system is controlled through the WSHLD HEAT switch in the ANTI-ICE grouping on the center switch panel. The switch has three positions: WSHLD HEAT (On), HOLD, and OFF. When power is applied to the aircraft, or the BATTERY switches are set On, the windshield anti-ice shutoff valve is energized to the open position. When open, the shutoff valve allows engine bleed air to the anti-ice modulating valve downstream. When the WSHLD HEAT switch is placed in the On position, a circuit is completed to the anti-ice modulating valve and WSHLD HT indicator light. The anti-ice modulating valve will move toward full open until the valve is fully open or the WSHLD HEAT switch is set to HOLD. When the switch is in the HOLD position, the anti-ice modulating valve will remain in its last attained position, and allow bleed air to the anti-ice heat exchanger. When the WSHLD HEAT switch is set to OFF, the anti-ice modulating valve will move towards the closed position until the valve is fully closed or the WSHLD HEAT switch is set to HOLD. The anti-ice modulating valve will fully open or close in approximately 15 seconds. The anti-ice heat exchanger cools the bleed air with ram air regulated by a ram air modulating valve. This valve is controlled by the downstream anti-ice duct temperature sensor and regulates the anti-ice bleed air temperature by varying the amount of ram air allowed into the heat exchanger.



❶ Anti-Ice Shutoff Valve is normally closed (must be energized open)

❷ Electrical ground on this wire turns WSHLD HT light **out**

❸ Electrical ground on this wire turns WSHLD OV HT light **on**

WINDSHIELD ANTI-ICE SYSTEM
Figure 6-3

WSHLD HT LIGHT

The green WSHLD HT light, located on the glareshield annunciator panel, provides the crew with a visual indication of windshield heat operation. The light is extinguished when the WSHLD HEAT switch is set to OFF. The light will illuminate when the WSHLD HEAT switch is moved out of the OFF position and remain illuminated until either the switch is set to OFF or an overheat thermoswitch trips shutting airflow off and extinguishing the green WSHLD HT light.

WSHLD OV HT LIGHT

Illumination of the amber WSHLD OV HT caution light, on the glareshield annunciator panel, indicates that the bleed air temperature in one or both of the windshield outlet nozzles has reached the respective low- or high-limit thermoswitch settings and the windshield anti-ice system has been shutdown by either the low- or high-limit thermoswitches. During ground operations, the light is controlled by the low-limit switches. In flight, the light is controlled by the high-limit switches. If the bleed air temperature in either outlet nozzle reaches 250°F (121°C) during ground operation, the low-limit overheat thermoswitches will close the anti-ice shutoff valve and illuminate the WSHLD OV HT caution light. If the outlet nozzle bleed air temperature in either nozzle reaches 347°F (175°C) in flight, the high-limit overheat thermoswitches will perform the same function. When the nozzle bleed air temperature drops to 240°F (115°C) during ground operations, or 311°F (155°C) in flight, the overheat thermoswitches will reset allowing the anti-ice shutoff valve to open and extinguish the WSHLD OV HT caution light. To avoid a false WSHLD OV HT indication upon landing, the low-limit overheat thermoswitch circuitry is disabled for 10 seconds after touchdown, after which normal functioning will resume.

WINDSHIELD DEFOG

Windshield internal defogging is accomplished using electrically heated windshield panels. The system is designed so that if desired, it may be activated before takeoff and remain on until shutdown. The system consists of two windshield panels with integral heaters, windshield heat control unit, system switch, L and R WS DEFOG annunciators, and associated aircraft wiring. The system utilizes the 115 VAC output from the inverter system to power the integral heaters. The control circuit receives 28 VDC through the 5-amp L WSHLD DEFOG and R WSHLD DEFOG circuit breakers on the pilot's and copilot's circuit breaker panels. The 115 VAC input to the system is provided through the 10-amp L and R WSHLD DEFOG circuit breakers on the pilot's and copilot's circuit breaker panels.

WSHLD DEFOG SWITCH

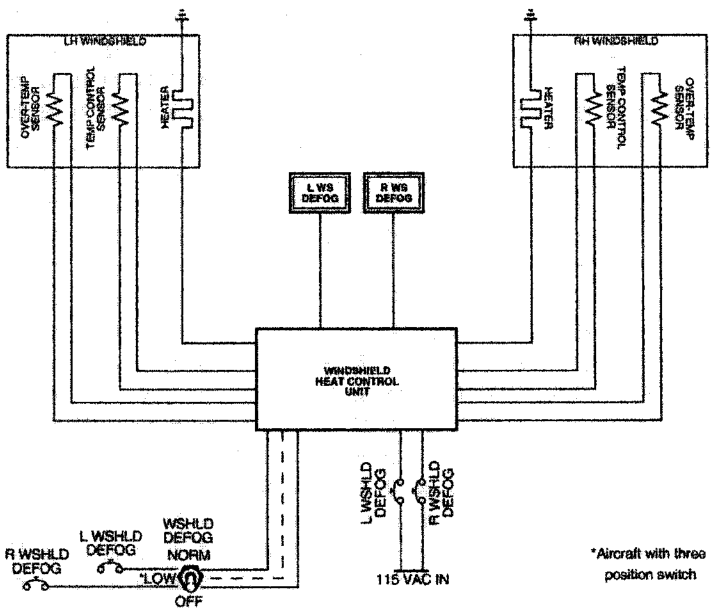
The windshield defog system is controlled through the WSHLD DEFOG switch in the ANTI-ICE group on the center switch panel.

Aircraft with two position switch:

The two switch positions are OFF and WSHLD DEFOG (On). When the WSHLD DEFOG switch is set to the On position, the integral heaters will be supplied 115 volts AC power from the inverter system via the windshield heat control unit. Normal operating temperature range with the switch on is 105°- 120°F (41° - 49°C).

Aircraft with three position switch:

The three switch positions are OFF, LOW and NORM. With the WSHLD DEFOG switch set to LOW or NORM, the integral heaters will be supplied 115 volts AC power from the inverter system via the windshield heat control unit. When the switch is set to LOW, operating temperature range of the windshield is 90°-97°F (32°-36°C). When the WSHLD DEFOG switch is set to NORM, operating temperature range of the windshield is 105°-120°F (41°-49°C).



WINDSHIELD DEFOG SYSTEM
Figure 6-4

NOTE

Normally, the left inverter will power the left windshield panel while the right inverter will power the right windshield panel. However, either inverter is capable of powering both windshield panels. Should one inverter switch be in the on position and the other in the off position, switching will occur allowing the operative inverter to power both windshield panels.

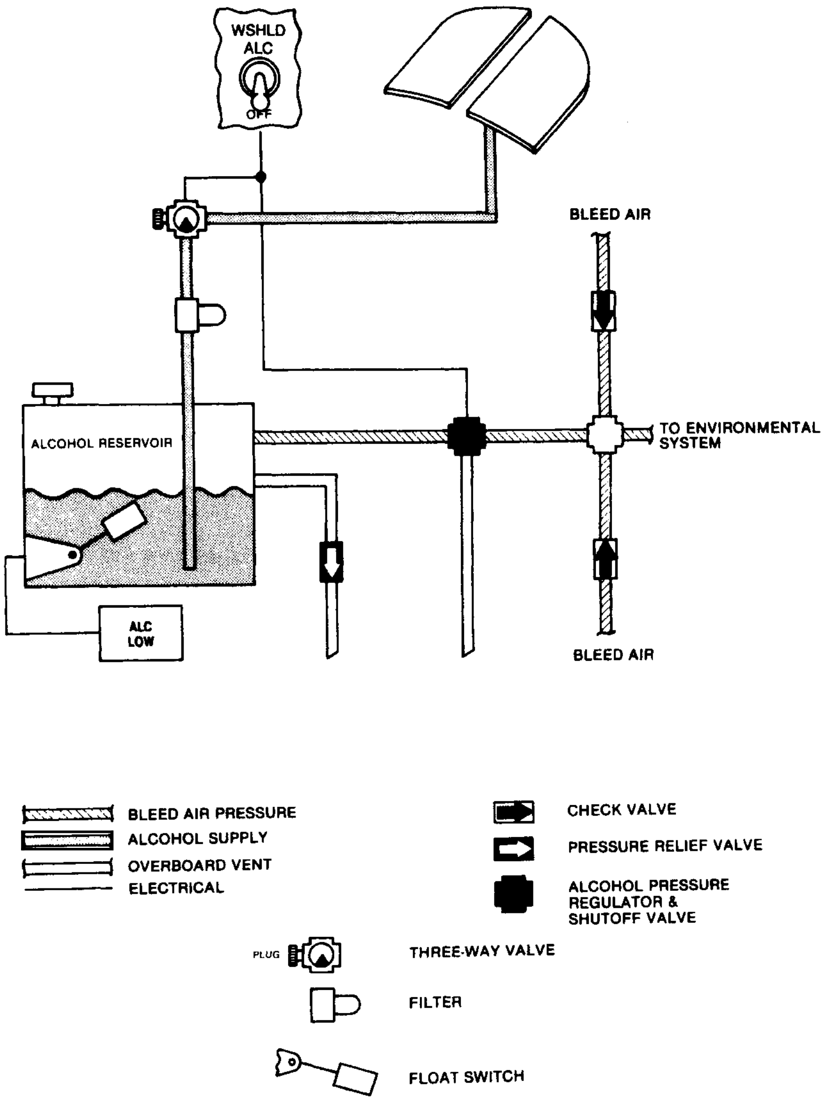
Normal system operation is indicated by illumination of the L and R WS DEFOG annunciators when the system is activated (windshield temperature below 85°F [29°C]). When the windshield is heated above 85°F (29°C), the annunciators will extinguish.

L AND R WS DEFOG ANNUNCIATORS

Illumination of a WS DEFOG annunciator, located on the glareshield annunciator panel, indicates an over-temperature condition, under-temperature condition or loss of AC or DC power. Temperature sensors are attached to each windshield panel which provide temperature data to the windshield heat control unit. Should the temperature of the windshield drop below 85°F (29°C), the applicable WS DEFOG annunciator will illuminate to alert the crew. Should the temperature of the windshield increase above 150°F (66°C), the applicable WS DEFOG annunciator will illuminate and the affected windshield will be deactivated. When the windshield cools to the normal operating range, the system will reactivate and the WS DEFOG annunciator will extinguish. Electrical faults detected by the system monitor will cause the affected WS DEFOG annunciator to illuminate.

WINDSHIELD ANTI-ICE — ALCOHOL SYSTEM

The alcohol anti-ice system is utilized for windshield anti-icing in the event of a windshield heating system malfunction. Alcohol anti-icing is accomplished by directing methyl alcohol over the pilot's windshield surface through an external outlet in the windshield heat outlet nozzle assembly. The system consists of a 2.35 gallon alcohol reservoir, a float switch, a filter, a relief valve, a three-way control valve, a bleed air shutoff and pressure regulator valve, a system switch, an amber ALC LOW caution light and associated aircraft wiring. The pressure relief valve is installed to prevent system overpressurization by venting system pressure greater than 2.6 psi above ambient, and bleed system pressure when the system is off. The system control circuits operate on 28 VDC supplied through the 5-amp ALCOHOL SYSTEM circuit breaker on the copilot's circuit breaker panel.



ALCOHOL ANTI-ICE SYSTEM
Figure 6-5

WSHLD ALC SWITCH

The windshield alcohol anti-ice system is controlled by the WSHLD ALC switch in the ANTI-ICE group on the center switch panel. The switch has two positions: WSHLD ALC (On) and OFF. When the switch is set to WSHLD ALC, circuits are completed to open the shutoff and pressure regulator valve and position the three-way control valve for alcohol flow to the windshield. The alcohol reservoir, pressurized to approximately 2.4 psi above ambient through the shutoff and pressure regulator valve, supplies alcohol to the windshield outlet through a filter and the three-way control valve. When the switch is set to OFF, the shutoff and pressure regulator valve will close, the three-way valve will reposition to cut off flow and system pressure will bleed off through the pressure relief valve.

ALC LOW CAUTION LIGHT

Illumination of the amber ALC LOW light, located on the glareshield annunciator panel, indicates the alcohol supply in the reservoir is low. The reservoir float switch will illuminate the light through a relay when in the full down position. When the relay is energized, a holding circuit is also energized to prevent the light from flickering due to the bobbing motion of the float. The holding circuit is deenergized when the BATTERY switches are set to OFF and the alcohol reservoir is filled. A completely filled reservoir will supply the windshield alcohol anti-ice system with approximately 45 minutes of alcohol flow.

PITOT-STATIC AND STALL WARNING ANTI-ICE

Anti-ice protection for the pitot-static probes, total temperature probe, stall warning vanes, and the pressurization static port is accomplished by energizing integral electrical heating elements in each component. The independent pitot-static probe, total temperature probe, and stall warning vane anti-ice systems consist of control switches, probe heaters, vane heaters, and pitot heat monitors. Both left, right and standby systems utilize the same PITOT HT light. The pressurization static port heater is part of the right system. The pitot-static probe heating elements receive 28 VDC through their respective 15-amp L PITOT HEAT, R PITOT-STALL-TAT HEAT, and STANDBY PITOT HEAT circuit breakers on the pilot's and copilot's circuit breaker panels. The total temperature probe heating element receives 28 VDC through the 15-amp TAT PROBE HEAT circuit breaker on the copilot's circuit breaker panel. Total temperature probe heat is only enabled when the squat switch is in the air mode. The pressurization static port heating element receives 28 VDC through the 15-amp R PITOT-STALL-TAT HEAT circuit breaker on the copilot's circuit breaker panel. The stall warning vane heating elements receive 28 VDC through the respective 15-amp L and R STALL VANE HEAT circuit breakers on the pilot's and copilot's circuit breaker panels.

An optional Triple Pitot Heat Indication System may be installed. The system does not change the anti-ice protection for the pitot-static probes, stall warning vane, or total temperature probe. It does add specific warning annunciators in the event of failure of either left, right, or standby pitot-static heat system. The annunciators are installed on the center instrument panel, below the PITOT HEAT placard.

PITOT HEAT SWITCHES

The pitot-static heat systems are controlled through the PITOT HEAT switches in the ANTI-ICE group on the center switch panel. Each switch has two positions: On (L or R) and OFF. When the L and R PITOT HEAT switches are set to On (L and R), power is supplied to each pitot-static probe heater, each stall warning vane heater, the total temperature probe heater (aircraft in flight), and the pressurization static port heater. The standby pitot-static probe, pressurization static port, and the total temperature probe heat are activated through the R PITOT HEAT switch.

PITOT HT LIGHT

A pitot heat monitor system is installed to alert the pilot if insufficient current is being applied to any of the pitot-static probe heating elements (left, right and standby). Each monitor is basically a relay which

maintains an open circuit for the PITOT HT light as long as sufficient current is being applied to the associated pitot-static probe heating element. In the event of a malfunction in or loss of power to the associated pitot-static probe heating element, the relay will release and complete the PITOT HT light circuit. Illumination of the amber PITOT HT light, in the glareshield annunciator panel, indicates a malfunction in either the left, right or standby pitot-static heat system, or that at least one PITOT HEAT switch is OFF.

L, R AND STBY PITOT HEAT LIGHTS (OPTIONAL)

In the event of a malfunction in the pitot-static heat system, the applicable amber L, R, or STBY annunciator, and both Master CAUT lights will illuminate and flash. Additional pitot-static heat system failures will cause the applicable individual L, R, or STBY annunciator to illuminate and both Master CAUT lights to illuminate and flash. When the aircraft is powered from the EMER BUS, the L and R pitot heat annunciators will illuminate to notify pilots that only the standby pitot heat is operational.

OXYGEN SYSTEM

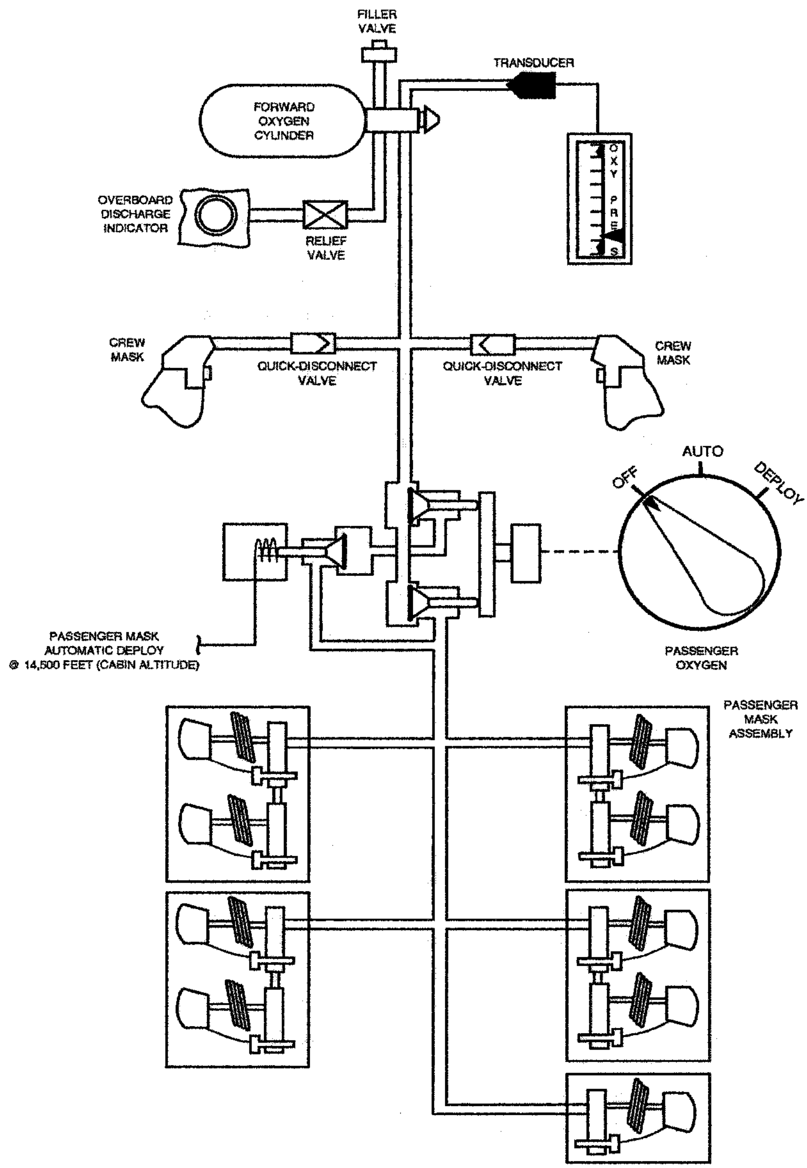
The aircraft oxygen system provides oxygen service for the crew and passengers. The system consists of the crew and passenger distribution systems, a high-pressure oxygen storage cylinder, a shutoff valve and pressure regulator assembly, an oxygen pressure transducer, an oxygen pressure indicator, an overboard discharge relief valve and indicator, a passenger oxygen control valve, lanyard actuated passenger mask oxygen valves, and crew and passenger oxygen masks. Electrical power to operate the passenger oxygen control valve and oxygen indicator is supplied through the 7.5-amp OXYGEN VALVE circuit breaker on the pilot's circuit breaker panel. Oxygen is available to the crew at all times and can be made available to the passengers either automatically above 14,500 (±250) feet cabin altitude, or manually at all altitudes through the use of the cockpit controls on the pilot's circuit breaker panel. The oxygen system is designed for use during emergency descent to a cabin altitude not requiring oxygen and is not to be used for extended periods of flight at cabin altitudes requiring oxygen or as a substitute for the normal pressurization system. Smoking is prohibited when oxygen is in use.

OXYGEN STORAGE AND PRESSURE REGULATION

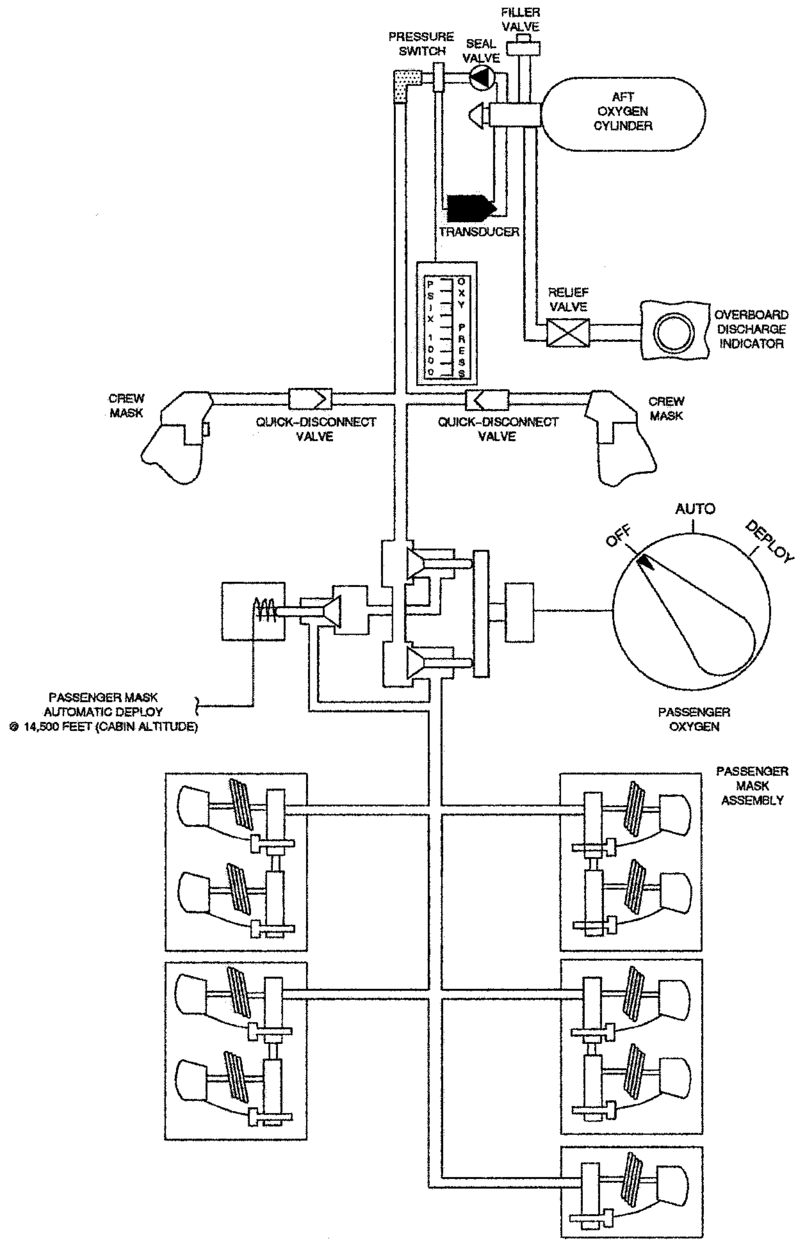
Several oxygen storage cylinder arrangements are used:

- Single cylinder in the nose compartment (40 cubic feet)
- Single cylinder in the nose compartment (77 cubic feet)
- Single cylinder in the vertical stabilizer (77 cubic feet)
- Dual cylinders — one in the nose compartment (40 cubic feet) and one in the vertical stabilizer (77 cubic feet)
- Dual cylinders — one in the nose compartment (77 cubic feet) and one in the vertical stabilizer (77 cubic feet)

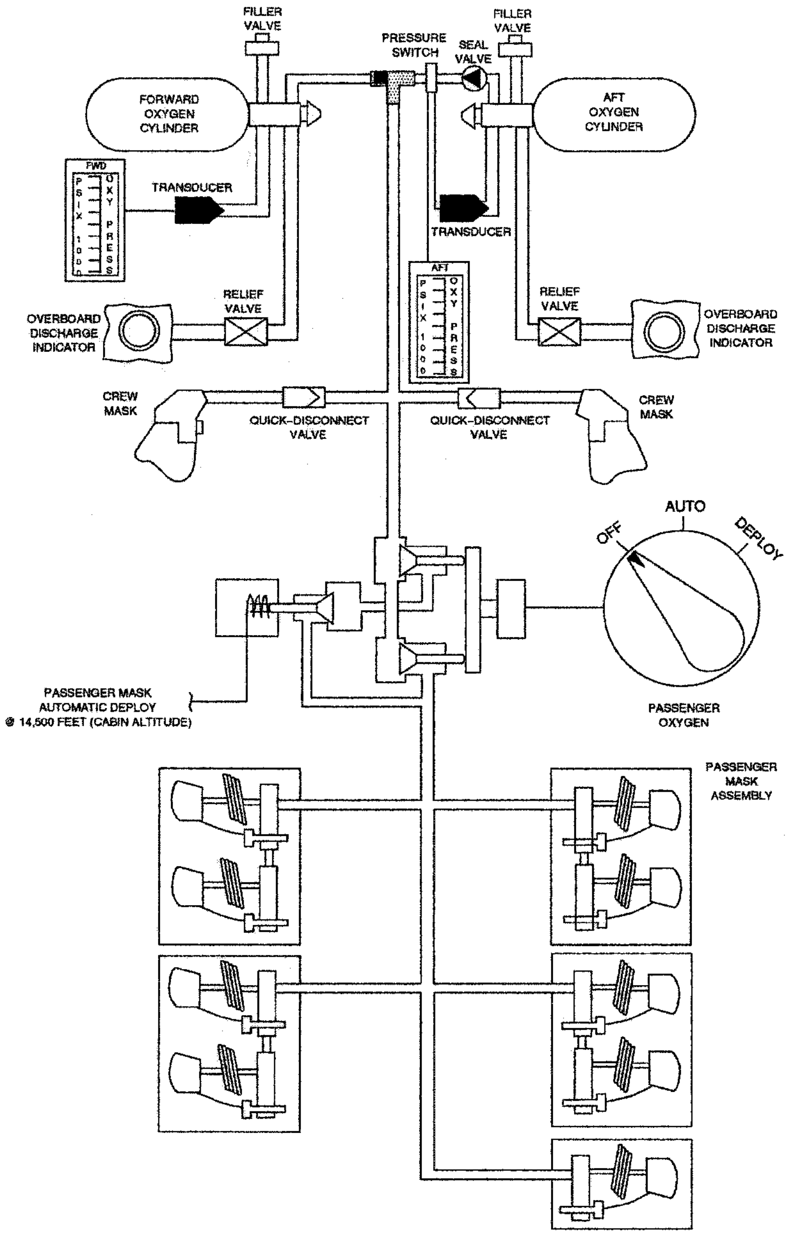
The shutoff and pressure regulator assembly forms an integral part of the storage cylinder and provides for pressure regulation, pressure indication, and servicing. Oxygen pressure for the passenger and crew distribution systems is regulated to a pressure of 60 to 80 psi. The shutoff and pressure regulator assembly also incorporates a burst disc pressure relief valve to discharge the oxygen cylinder contents overboard in the event that cylinder pressure reaches 2700 to 3000 psi. Should the cylinder contents be discharged overboard, the green overboard discharge indicator will be ruptured or missing. Storage cylinders mounted in the nose compartment have the overboard discharge indicator located on the lower left side of the nose section. Storage cylinders mounted in the vertical stabilizer have the overboard discharge indicator located on the left side at the base of the vertical stabilizer.



(with single forward cylinder)
OXYGEN SYSTEM SCHEMATIC
Figure 6-6



(with single aft cylinder)
OXYGEN SYSTEM SCHEMATIC
Figure 6-6A



(with dual cylinders)
OXYGEN SYSTEM SCHEMATIC
Figure 6-6B

OXYGEN PRESSURE INDICATOR

The vertical-scale oxygen pressure indicator is located on the pilot's circuit breaker panel. The indicator face is marked from 0 to 2000 psi in 250 psi increments and is controlled by an electric transducer plumbed to the high-pressure side of the shutoff and pressure regulator assembly.

The oxygen supply system may be a single cylinder or dual cylinder system. The pressure indicator is located on the pilot's circuit breaker panel. In aircraft with dual systems, a second pressure indicator is added to the pilot's circuit breaker panel to allow determination of the oxygen pressure in each oxygen cylinder. The transducer for the aft oxygen system is wired through a pressure switch to the aft pressure indicator. The pressure switch senses loss of pressure in the aft oxygen tube. If the aft cylinder is pressurized but the supply tube is not (for example; due to blockage) the indicator will read zero. Since pressure will vary due to temperature the fore and aft cylinder may not indicate the same during flight.

OXYGEN SYSTEM COCKPIT CONTROLS

The oxygen system cockpit controls consist of one control valve, labeled PASSENGER OXYGEN OFF-AUTO-DEPLOY, located on the pilot's circuit breaker panel. The control valve controls oxygen availability to the passenger oxygen distribution system and provides automatic or manual mode selection. Oxygen is available to the crew oxygen distribution system at all times when the oxygen cylinder shutoff valve is open. Control positions and system functions are as follows:

1. With the PASSENGER OXYGEN valve in the AUTO position, oxygen is available to the passenger distribution system and the passenger masks will deploy automatically in the event cabin altitude climbs to 14,500 feet. Should the cabin altitude reach 14,500 (±250) feet, an electrical signal from the pressurization indicator will cause the solenoid valve (integral with the PASSENGER OXYGEN valve) to open, the passenger oxygen masks will deploy, and the cabin overhead lights will illuminate to provide maximum visibility for donning masks. Normally, the control should be in this position.

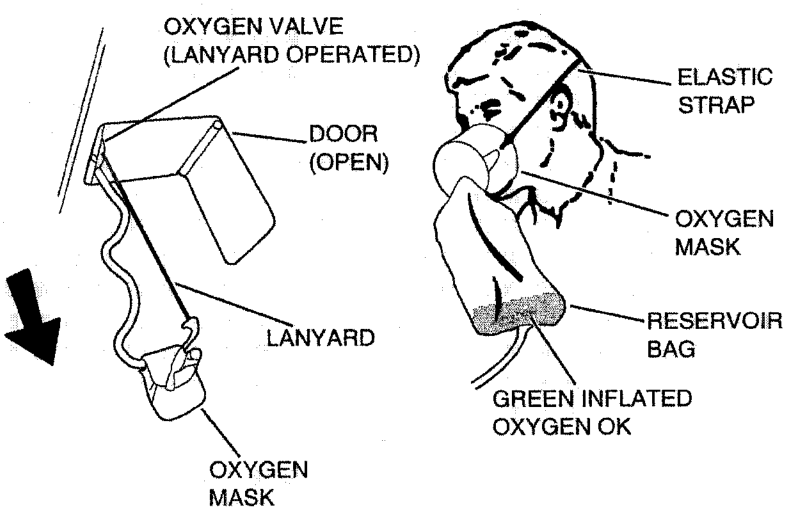
2. With the PASSENGER OXYGEN valve in the DEPLOY position, oxygen is available to the passenger distribution system and the passenger masks will deploy. Setting the PASSENGER OXYGEN valve to the DEPLOY position will manually open the PASSENGER OXYGEN valve and allow oxygen pressure to deploy the passenger masks. This position can be used to

deploy the passenger masks at any cabin altitude and must be used if electrical power is unavailable.

3. With the PASSENGER OXYGEN valve in the OFF position, oxygen will not be available to the passenger distribution system regardless of cabin altitude. This position can be used when oxygen is required for the crew members only.

PASSENGER MASKS

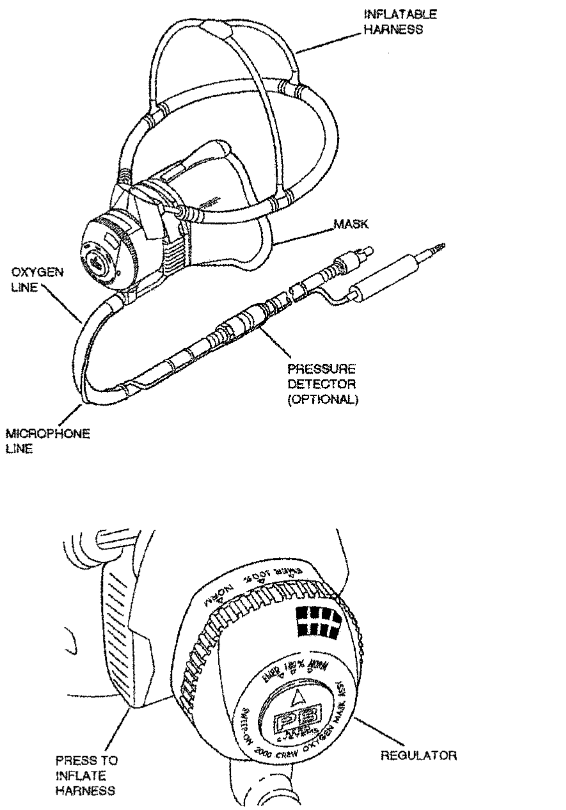
The passenger oxygen masks are stowed in compartments in the convenience panels above the passenger seats. Whenever the compartment doors open automatically (PASSENGER OXYGEN-AUTO) or manually (PASSENGER OXYGEN-DEPLOY) the passenger oxygen masks will fall free and oxygen will be available for passenger use. Passengers should don masks and pull the mask lanyard to initiate oxygen flow. An orifice incorporated in the mask tubing connections will provide a constant flow rate of 4.5 liters per minute. A green area of the reservoir bag inflates when oxygen is flowing. Should the doors be inadvertently opened from the cockpit, pressure must be bled from the system by pulling one of the mask lanyards before the masks can be restowed. The compartment doors can be opened manually for mask cleaning and servicing per Maintenance Manual instructions.



PASSENGER MASK
Figure 6-7

CREW MASKS — Puritan Bennett Sweep-On 2000

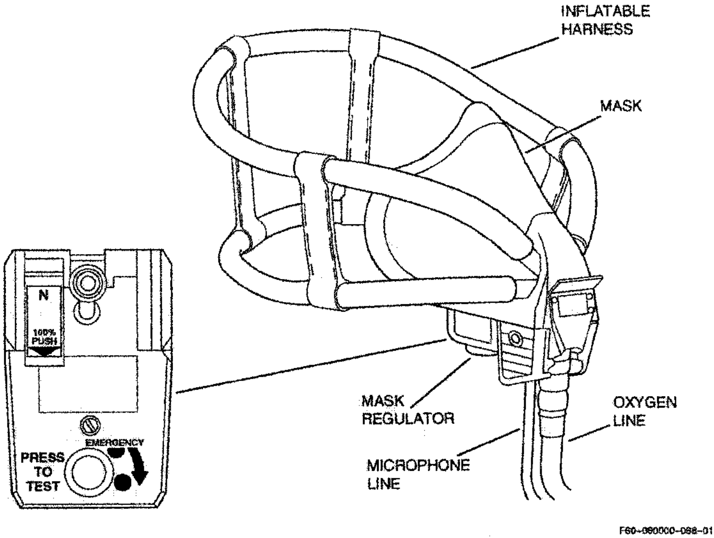
The crew oxygen masks are quick-donning masks which contain a mask mounted automatic diluter-demand regulator with a single knob mode control, an inflatable harness, and a microphone.The flight crew oxygen masks are stowed in a stowage cup just aft of the pilot and co-pilot on the bulkhead or in stowage boxes just aft of the pilot's and co-pilot's circuit breaker panels. The mask regulators provide for normal, 100% oxygen, and emergency operation (refer to the FAA Approved Airplane Flight Manual for detailed operational procedures). The mask incorporates a microphone controlled by the NORM MIC/OXY MIC switch on the respective audio control panel. When the OXY MIC is in use, a voice-activated hot interphone exists for crew member communication. An optional oxygen pressure detector may be located in the oxygen line. If sufficient pressure is available in the line, the detector shows "green".



CREW MASK — PURITAN BENNETT SWEEP-ON 2000
Figure 6-8

CREW MASKS — Scott ATO

The flight crew oxygen masks are stowed in accessible stowage boxes just aft of the pilot's and copilot's circuit breaker panels or in storage cups just aft of the pilot and copilot on the bulkhead. The mask regulators provide for normal, 100% oxygen, and emergency operation (refer to the Airplane Flight Manual for detailed operational procedures). Each mask incorporates a microphone controlled by the NORM MIC/ OXY MIC switch on the respective audio control panel. When the OXY MIC is in use, a voice-activated hot interphone exists for crew member communication. An optional oxygen pressure detector may be located in the oxygen line. If sufficient pressure is available in the line, the detector shows "green".



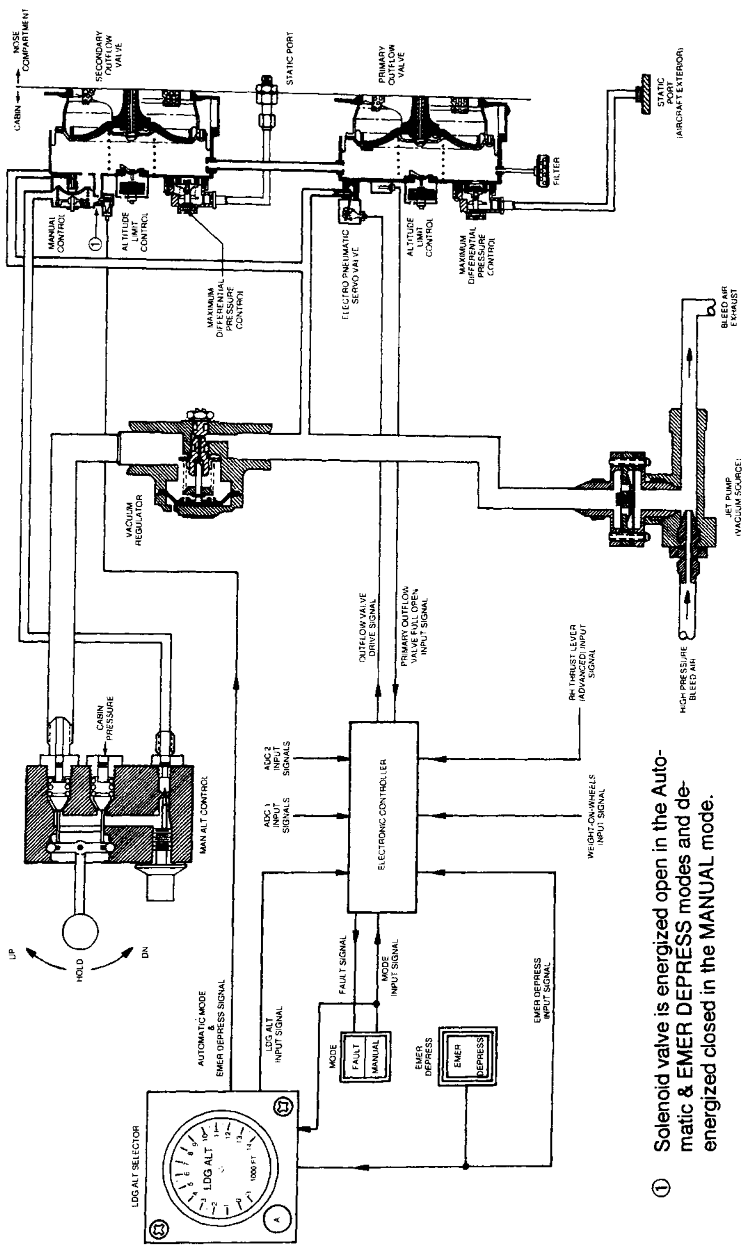
CREW MASK — SCOTT ATO
Figure 6-8A

PRESSURIZATION SYSTEM

Cabin pressurization is provided by conditioned air entering the cabin through the air distribution ducts and controlled by modulating the amount of air exhausted from the cabin. The pressurization system consists of a cabin primary outflow valve, a cabin secondary outflow valve, an electronic pressurization controller, a LDG ALT selector, a MAN ALT control valve with rate control, a MODE switch, an EMER DEPRESS switch, a pressurization vacuum jet pump, a vacuum regulator, a pressurization indicator, two emergency pressurization valves, two emergency pressurization aneroid switches, an amber PRESS SYS caution light, an amber EMER PRESS caution light, and an aural warning system. All system controls are located in the PRESSURIZATION group on the copilot's switch panel. The pressurization indicators are located directly above the system controls. Power for the control circuits is 28 VDC supplied through the 5-amp CABIN PRESS SYS circuit breaker on the copilot's circuit breaker panel. Power for the pressurization indicator is 28 VDC supplied through the 2-amp CABIN PRESS IND circuit breaker on the pilot's circuit breaker panel. Automatic and manual pressurization modes are available during EMER BUS mode. The pressurization indicator is operative during EMER BUS mode.

NORMAL PRESSURIZATION

Normal pressurization is controlled by regulating control pressure to the cabin primary and secondary outflow valves. The control pressure may be regulated automatically by the electronic pressurization controller or manually by the MAN ALT control knob. A pressurization vacuum jet pump provides vacuum (servo pressure) to operate the outflow valves. MANUAL mode operation is completely independent of the aircraft electrical system. If the cabin-to-ambient differential pressure reaches 9.7 psid, the positive pressure relief metering section of the outflow valves will cause the outflow valves to open and maintain a 9.7 psi differential. The outflow valves incorporate a cabin altitude limiter which limits cabin altitude to approximately 13,700 (±500) feet should the system fail to maintain the normal cabin altitude. Should the cabin altitude reach approximately 13,700 (±500) feet, the altitude limiters will vent cabin pressure to the outflow valve control chambers causing the valves to close. Should a rapid descent cause a negative pressure in the cabin, both the primary and secondary outflow valves will open to vent ambient atmospheric pressure to the cabin.



PRESSURIZATION SYSTEM SCHEMATIC
Figure 6-9

13-211B

When the system is in the automatic mode, the electronic controller maintains cabin pressure based on air data from the aircraft's air data computers, landing field elevation selected on the LDG ALT selector, position of the thrust levers, position of the landing gear squat switch, and the system's preprogrammed climb and descent schedules. The electronic controller features built-in test equipment which performs fault detection and annunciation routines during ground and flight operation. Should a fault be detected, the FAULT annunciator on the mode switch will illuminate and the system will automatically revert to manual mode. Depressing the mode switch will extinguish the FAULT annunciator and illuminate the MANUAL annunciator.

When the system is in the manual or fault modes, the crew maintains the desired cabin pressure using the MAN ALT and MAN RATE controls to position the outflow valves. Moving the MAN ALT control to UP or DN controls the outflow valves directly causing them to open or close as appropriate until the MAN ALT control is moved to the center position. The desired cabin altitude is then controlled by the crew by reference to the pressurization indicator. The rate at which the outflow valves will respond to MAN ALT control movement is controlled by rotating the MAN RATE knob from MIN to MAX as desired.

EMERGENCY PRESSURIZATION

In the event of normal cabin airflow malfunction, emergency pressurization is provided by routing low pressure engine bleed air directly into the cabin through the emergency pressurization valves. Emergency pressurization is accomplished automatically by opening the emergency pressurization valves in response to signals from the aneroid switches when the cabin altitude increases to 9500 (±250) feet or manually by setting the BLEED AIR switches to EMER. When the aircraft is below 25,000 feet pressure altitude and the system is in automatic mode with a takeoff or landing field elevation greater than 8000 feet specified, the aneroid switches will not trigger the emergency pressurization unless the cabin altitude increases to 14,500 (±250) feet. Emergency pressurization is provided by two independent circuits — left and right. If triggered automatically, the left and right circuits will activate approximately at the same time in response to the aneroid switch signals. If triggered manually, the left and right circuits may be activated separately. When emergency pressurization is triggered the following events occur:

- Emergency pressurization valve opens
- The bleed-air mix valve goes to the low-pressure bleed port

- The bleed-air shutoff valve closes
- The wing anti-ice bypass circuit is deactivated
- The EMER PRESS annunciator illuminates

The result is that engine low-pressure bleed air is ducted directly into the cabin air overhead and floor diffusers. This bypasses all bleed-air plumbing in the tailcone area and will stabilize cabin altitude if the pressurization failure has occurred in that area. The emergency pressurization valves are energized to the open position and de-energized for normal bleed-air flow. Each valve is independent of the other and, whenever both valves are open, temperature control and bleed air for wing and windshield anti-ice will be unavailable. Operating power for emergency valve actuation is 28 VDC supplied through the 7.5-amp L and R BLEED AIR circuit breakers on the pilot's and copilot's circuit breaker panels.

PRESSURIZATION CONTROLS AND INDICATORS

MODE SWITCH

The MODE switch is an alternate-action switch located on the copilot's switch panel. The switch is used to toggle the pressurization system between the automatic and manual modes. Upon initial power-up, the system will be in automatic mode if no faults were revealed in the self-test. If a fault is detected, the system will revert to manual and the FAULT annunciator (part of the MODE switch) will illuminate. To switch from automatic to manual mode and vice versa, the MODE switch is depressed and released. When manual mode is selected, the MANUAL annunciator (part of the MODE switch) will be illuminated.

MAN ALT CONTROL

The MAN ALT control is a 3-position valve located on the copilot's switch panel. The control is used to direct either regulated vacuum or cabin pressure to the outflow valves positioning them so that the desired cabin altitude results. Moving the control to the UP detent applies regulated vacuum to the outflow valves causing them to move toward the open position and increasing cabin altitude. Moving the control to the DN detent applies cabin pressure to the outflow valves causing them to move toward the close position and decreasing cabin altitude. When the control is in the center position, the outflow valves

remain in their last attained position stabilizing the cabin altitude. Incorporated into the MAN ALT control valve is a MAN RATE control. The MAN RATE control is an adjustable needle valve which restricts the passage between the MAN ALT valve and the outflow valves. The rate at which the outflow valves react to the MAN ALT control is adjusted by varying this restriction.

EMER DEPRESS SWITCH

The EMER DEPRESS switch is an alternate-action switch located on the copilot's switch panel. A guard is installed over the switch to prevent inadvertent actuation. The switch is used to depressurize the cabin and increase cabin airflow for smoke and fume evacuation. The EMER DEPRESS function is available in both automatic and manual modes. When EMER DEPRESS is selected, the outflow valves receive a signal to move toward the full open position. The cabin altitude will ascend to the aircraft altitude or 13,700 (±500) feet (cabin altitude limiter), whichever is less. When EMER DEPRESS mode is selected, the EMER DEPRESS annunciator (part of the EMER DEPRESS switch) will be illuminated. To de-select this mode, depress and release the EMER DEPRESS switch.

LDG ALT SELECTOR

The LDG ALT selector is located on the copilot's switch panel. The selector consists of a circular instrument graduated from -1000 to 14,000 feet in 500-foot increments and a setting knob used by the crew to select the landing field elevation. As the setting knob is moved, the needle on the instrument moves to show the selected landing altitude. The selected landing field elevation signal is supplied to the pressurization controller for use in determining the appropriate cabin climb and descent profile. The elevation of the destination airport is selected on the LDG ALT selector prior to takeoff and checked again prior to descent. The LDG ALT selector has no effect in manual mode.

PRESSURIZATION INDICATOR

The pressurization indicator consists of a circular CABIN ALT instrument graduated from -1000 to 20,000 feet, a circular CABIN RATE instrument graduated from 2000 feet per minute down to 2000 feet per minute up, and a digital readout to display differential pressure. All three components of the indicator require electrical power. If power

to the indicator is lost, the CABIN ALT and CABIN RATE needles will go to the OFF position and the DIFF PRESS display will go blank. The DIFF PRESS readout is capable of displaying differential pressure from 0.0 to 9.9 psid. If the differential pressure exceeds the maximum of 9.8 psid, the display will flash. If the differential pressure exceeds 0.5 psid negative, the DIFF PRESS readout will flash "0.5". The indicator provides outputs for the following:

- 8750 (±250) feet cabin altitude — Illuminates PRESS SYS caution light if in the manual mode.
- Activates cabin altitude aural warning horn at:
  - 10,100 (±250) feet cabin altitude whenever the aircraft is above 25,000 feet pressure altitude.
  - 10,100 (±250) feet cabin altitude if the aircraft is below 25,000 feet pressure altitude and the system detects takeoff or landing at a field elevation less than 8000 feet.
  - 14,500 (±250) feet cabin altitude if the aircraft is below 25,000 feet pressure altitude and the system detects takeoff or landing at a field elevation greater than 8000 feet.
- 14,500 (±250) feet cabin altitude — Activates automatic deployment of passenger oxygen masks and turns on cabin overhead lighting.
- Differential pressure exceeds - 0.5 or + 9.8 psid — Illuminates PRESS SYS caution light.

PRESS SYS LIGHT

The amber PRESS SYS caution light, on the glareshield annunciator panel, illuminates to annunciate the following conditions:

- Differential pressure has exceeded the limit (- 0.5 to + 9.8 psid).
- *In automatic mode cabin altitude exceeds:*
  - 14,500 (±250) feet if the aircraft is below 25,000 feet pressure altitude and the system detects takeoff or landing at a field elevation greater than 8000 feet.
  - 8600 (±200) feet for all other conditions.
- *In manual mode* cabin altitude exceeds 8750 (±250) feet.
- The pressurization system detects a fault.

EMER PRESS LIGHT

The amber EMER PRESS caution light, on the glareshield annunciator panel, illuminates to annunciate the following conditions:

- The emergency pressurization has activated on one or both sides.
- If emergency pressurization has not activated, an electrical fault exists which may prevent activation of emergency airflow.

BLEED AIR SWITCHES — EMER FUNCTION

The L and R BLEED AIR switches may be used to manually activate emergency pressurization. When a BLEED AIR switch is set to EMER, the respective bleed-air shutoff valve will close and emergency pressurization valve will be energized open and the high-stage bleed air will be shut off. To reset the emergency pressurization valve, reduce power on the respective engine and set the BLEED AIR switch to OFF.

CABIN ALTITUDE WARNING HORN and MUTE FUNCTION

A cabin altitude aural warning horn will sound to alert the crew should the cabin altitude reach 10,100 (±250) feet. The horn is controlled by an output from the pressurization indicator which activates the warning horn circuit. The cabin altitude warning horn circuit is tested through the SYSTEM TEST switch on the instrument panel. The MUTE switch, on right thrust lever knob, may be used to interrupt the horn for approximately 60 seconds in the event the horn sounds.

CABIN ALT HI LIGHT

On aircraft 60-271 and subsequent and prior aircraft modified by SB 60-31-1, a red CABIN ALT HI light will illuminate in conjunction with the cabin altitude altitude warning horn when the cabin altitude reaches 10,100 (±250) ft.

SYSTEM TEST SWITCH — CABIN ALT FUNCTION

The rotary-type SYSTEM TEST switch on the instrument panel is used to test the cabin altitude warning system. Rotating the switch to CABIN ALT and depressing the switch TEST button will provide a ground simulating the 10,100-foot trigger signal.

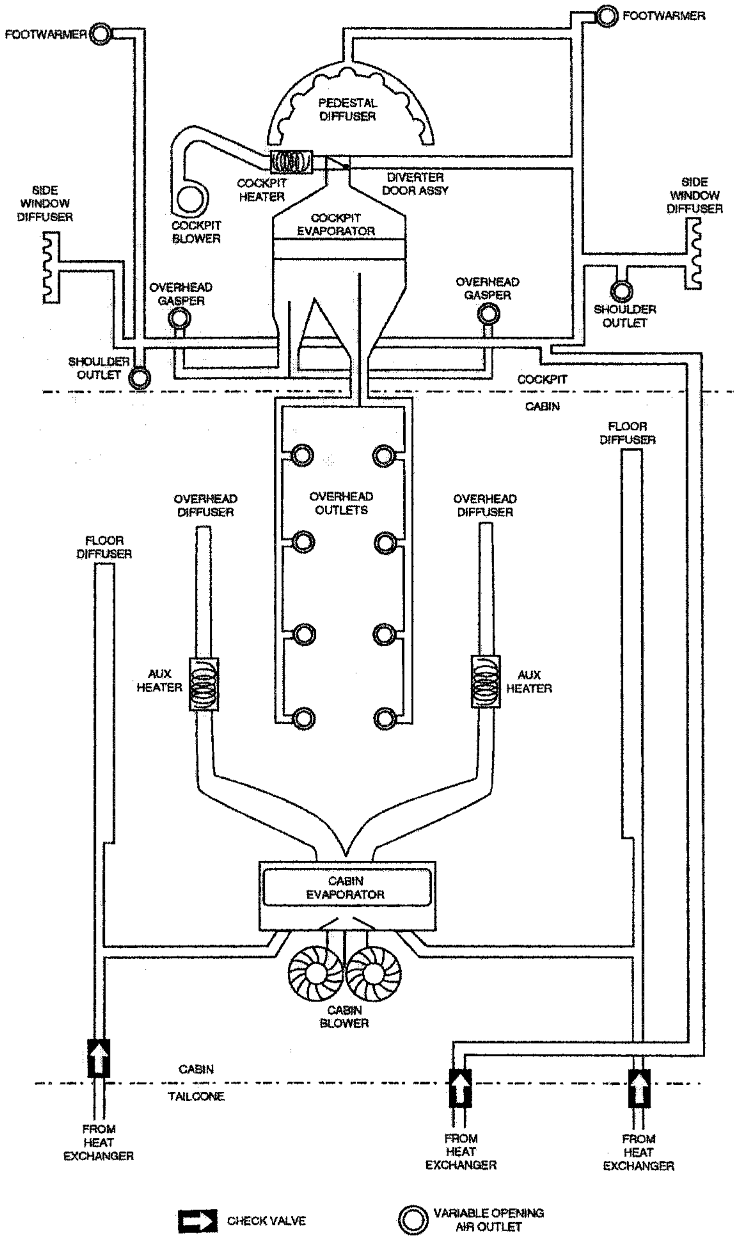
AIR CONDITIONING AND HEATING

Primary heating and cooling is accomplished by controlling the temperature of the bleed air entering the independently controlled cockpit and cabin air distribution systems. *On aircraft 60-001 thru 60-173,* an R-12 vapor cycle cooling system is installed to provide additional cooling at lower altitudes and during ground operations. *On aircraft 60-174 and subsequent,* an R-134A vapor cycle cooling system is installed to provide additional cooling. An auxiliary (electrical) heating system is installed to provide additional heating for the cabin, if desired.

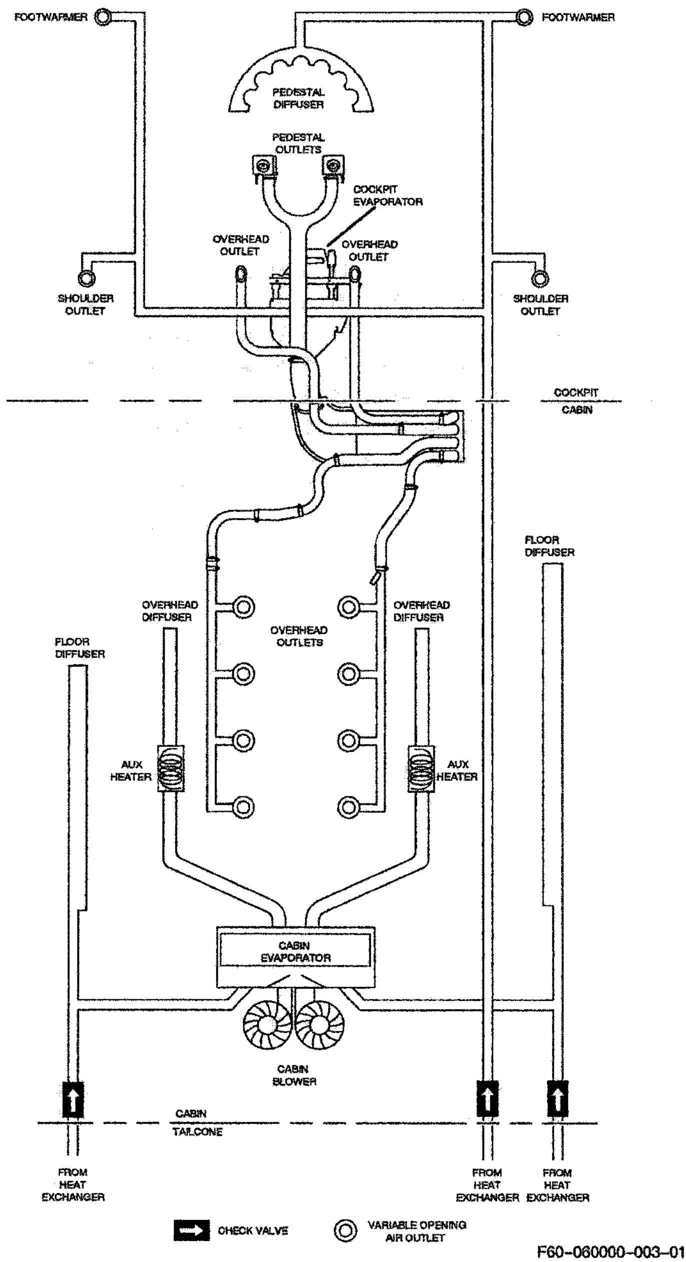
PRIMARY HEATING AND COOLING-BLEED AIR

Cockpit and cabin temperature is regulated by controlling the temperature of the pressurization bleed air entering the cockpit and cabin air distribution systems. With the BLEED AIR switches ON and the CAB AIR switch ON, engine bleed air is admitted to the ram air heat exchanger through a flow control valve. The bleed air is cooled in the heat exchanger by ram air entering the dorsal inlet, passing through the exchanger, and then exiting overboard. The conditioned bleed air then passes out of the exchanger into the cockpit and cabin air distribution ducts. The temperature of the conditioned air is controlled by the temperature control valve on each distribution system duct. These valves bypass some of the bleed air around the heat exchanger and mix it directly with the conditioned air exiting the heat exchanger.

Temperature control valve position, thus, temperature regulation, is pneumatically controlled by the electrically operated temperature control system. Whenever either cabin or cockpit temperature AUTO-MAN switch is set to AUTO, the respective system temperature controller will automatically maintain the temperature set with the (CREW or CABIN) COLD-HOT selector. The cabin temperature AUTO-MAN switch also has a CABIN position which allows the temperature to be set using a temperature control panel in the cabin area. The controllers maintain the selected temperature by comparing input signals from various temperature sensors and then electrically controlling the torque motors that provide pneumatic pressure (servo air) to the temperature control valves. Duct temperature sensors are installed in each system to close the temperature control valves and light the DUCT OV HT caution light whenever excessively high duct temperatures are sensed. The cockpit and cabin air temperature sensors have small blowers that draw air past the sensing elements to assure rapid sensing of temperature changes.



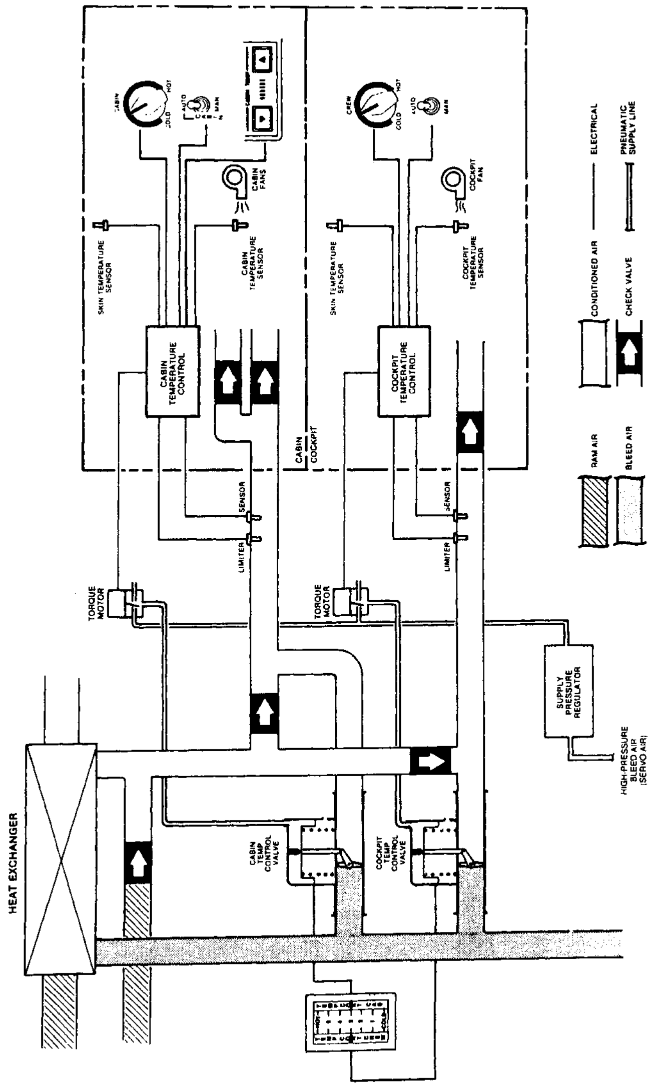
(Aircraft 60-001 thru 60-173)
AIR DISTRIBUTION SCHEMATIC
Figure 6-10



(Aircraft 60-174 and Subsequent)

AIR DISTRIBUTION SCHEMATIC

Figure 6-10A



TEMPERATURE CONTROL SCHEMATIC
Figure 6-11

20-58B-1

Whenever MAN mode is selected with either system AUTO-MAN switch, temperature control valve position is controlled by rotating the CREW or CABIN COLD-HOT selector switch. The rheostat type switch will vary the input current to the affected torque motor to pneumatically position the temperature control valve. Duct overheat protection is provided in this mode also.

Power for the temperature control circuits is 28 VDC supplied through the 1-amp AUTO TEMP CONT circuit breaker on the copilot's circuit breaker panel (AUTO mode), and the 1-amp MANUAL TEMP CONTROL circuit breaker on the pilot's circuit breaker panel (MAN mode).

CAB AIR SWITCH

The CAB AIR switch, on the copilot's switch panel, controls the flow control valve. With the BLEED AIR switches ON, setting the CAB AIR switch ON will de-energize the flow control valve controlling solenoid and allow system pressure to the valve's controlling chambers. Internal pressures will position the valve shutoff sleeve, controlling bleed-air flow to the heat exchanger. Setting the CAB AIR switch OFF will energize the valve control solenoid which will shutoff control pressure and allow the valve shutoff sleeve to block bleed-air flow.

CREW AUTO-MAN SWITCH

An AUTO-MAN mode switch is located below the CREW COLD-HOT selector on the copilot's switch panel. The switch provides automatic or manual mode operation for the cockpit temperature control system. When AUTO is selected, the cockpit temperature controller will automatically position the cockpit temperature control valve (through inputs to the torque motor) to maintain the temperature set on the CREW COLD-HOT selector. When MAN is selected, cockpit temperature control valve position is controlled directly from the CREW COLD-HOT selector.

CABIN AUTO-CABIN-MAN SWITCH

An AUTO-CABIN-MAN switch is located below the CABIN COLD-HOT selector on the copilot's switch panel. The switch provides automatic, automatic remote, and manual mode selection for the cabin temperature control system. When AUTO is selected, the cabin temperature control will automatically position the cabin temperature control valve (through inputs to the torque motor) to maintain the temperature set on the CABIN COLD-HOT selector above the AUTO-MAN switch. The CABIN mode operates identical to AUTO except that the temperature is set using a remote temperature selector in the cabin. When MAN is selected, cabin temperature control valve position is controlled directly from the CABIN COLD-HOT selector on the copilot's switch panel.

CREW AND CABIN COLD-HOT SELECTOR SWITCHES

A CREW COLD-HOT and a CABIN COLD-HOT selector switch are located on the copilot's switch panel and a remote temperature selector is located in the cabin. In system AUTO mode, these switches are used to select the desired system temperature to be maintained automatically by the temperature controllers. In MAN mode, these rheostat type switches directly vary the current input to the pneumatic torque motors which position the temperature control valves. Rotating the switches clockwise from COLD to HOT is equivalent to selecting temperatures ranging from 60°F (16°C) to 90°F (32°C). When CABIN is selected on the cabin AUTO-CABIN-MAN switch, a remote selector switch in the cabin can be used to select the desired cabin temperature.

CREW/CAB TEMP CONT INDICATOR

A CREW/CAB TEMP CONT indicator is located on the copilot's instrument panel to provide the crew with a visual indication of each temperature control valve position. The indicator is a dual-reading vertical-scale instrument. The indicator face consists of a center scale reading from COLD to HOT and two pointers on opposite margins of the scale. The left margin is labeled TEMP CONT CREW and the right margin is labeled TEMP CONT CAB. The increments on the center scale represent the respective temperature control valve position from full closed (COLD) to full open (HOT). Each pointer is electrically controlled by an externally mounted potentiometer on each temperature control valve. The potentiometers are mechanically linked to the duct airflow control flappers. The indicator operates on 28 VDC supplied through the 1-amp TEMP CONTROL IND circuit breaker on the pilot's circuit breaker panel.

CAB TEMP INDICATOR

The CAB TEMP indicator, located on the copilot's instrument panel, is used to provide the crew with visual indication of cabin temperature. The indicator is calibrated from 60°F to 90°F in three colored segments as follows: 60°F to 70°F, blue; 70°F to 80°F, green; 80°F to 90°F, red. The indicator operates on 28 VDC supplied through the 1-amp CABIN TEMP IND circuit breaker on the copilot's circuit breaker panel.

R-12 COOLING SYSTEM *(Aircraft 60-001 thru 60-173)*

The R-12 vapor cycle cooling system is installed for cockpit and cabin cooling during ground operations, inflight cooling, and cabin dehumidification. Power must be supplied by an engine generator, ground power unit or APU. When the COOL-OFF switch is set to COOL, power is supplied to the compressor motor and the system refrigerant is compressed and circulated under high pressure through a receiver/dehydrator (dryer) to the cockpit and cabin evaporators. A cockpit blower, located below the cockpit floor, and a cabin blower, located in the aft cabin overhead, circulate air through the system evaporators to provide cooling. Also, pressurization bleed air is used to provide airflow through the cabin evaporator. System overpressurization protection is provided by a pressure switch downstream of the compressor motor. The switch will open to break the motor power circuit should system pressure exceed limits and reset when pressure drops to within limits. If the cabin temperature control valve exceeds approximately 15° open (HOT), a switch will open to disable the compressor motor to prevent overloading the system. As soon as the valve opening returns to 15° or less, power will be restored. The refrigeration system is automatically cutout during engine start, STAB WING HEAT operation, and inflight when only one generator is operating. When the aircraft is on external power, the compressor motor is powered by 28 VDC supplied through a 175-amp current limiter connected to the battery charging bus and a power contactor. When the generators are operating, the compressor motor is powered by 28 VDC supplied through two power contactors and two 175-amp current limiters connected to the generator buses. A fault isolator will remove power from the compressor motor should a fault occur which causes the compressor load to become unequally shared between the generators (except during single generator operation on the ground). System control circuits, including the cabin blowers, are powered by 28 VDC supplied through the 5-amp FREON CONTROL circuit breaker on the pilot's circuit breaker panel. The cabin blowers are powered by 28 VDC through a 50-amp current limiter. Speed control circuits for the cabin blowers are powered through the 5-amp CABIN FAN circuit breaker on the copilot's circuit breaker panel. The cockpit blower (including speed control circuit) is powered by

28 VDC through the 15-amp CREW FAN circuit breaker on the copilot's circuit breaker panel.

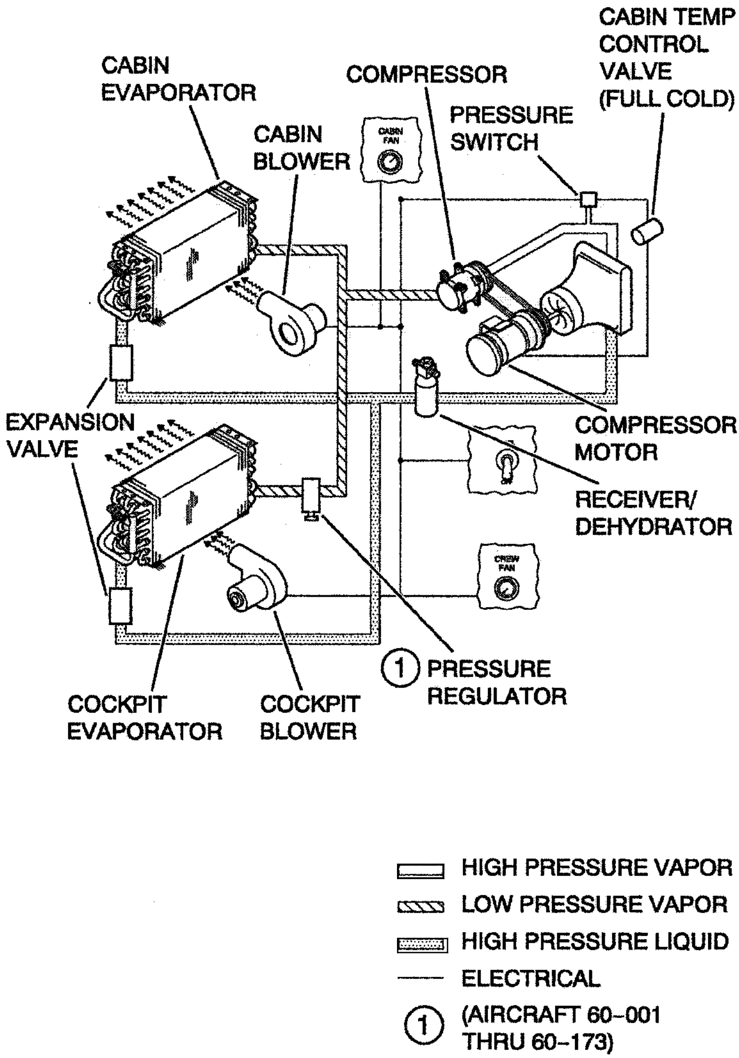
R-134A COOLING SYSTEM *(Aircraft 60-174 and Subsequent)*

The R-134A vapor cycle cooling system is installed for cockpit and cabin cooling during ground operations, inflight cooling, and cabin dehumidification. On the ground, power must be supplied by an engine generator, APU or ground power unit. In flight, the air conditioning system must be powered by both engine generators. When the COOL-OFF switch is set to COOL, power is supplied to the compressor motor and the system refrigerant is compressed and circulated under high pressure through a receiver/dehydrator (dryer) to the cockpit and cabin evaporators. A cockpit blower, located below the cockpit floor, and a cabin blower, located in the aft cabin overhead, circulate air through the system evaporators to provide cooling. Also, pressurization bleed air is used to provide airflow through the cabin evaporator.

The system is protected against overpressure conditions by two separate safety devices. The first is a binary high/low pressure switch located on the compressor discharge port. This switch will open at approximately 350 psig and will interrupt power to the compressor control circuit. This in turn will de-energize the compressor motor relay and remove power to the compressor motor. The system pressure will then drop. The switch will also interrupt power to the compressor control circuit under low pressure conditions. This low pressure switch may shut down the compressor if the average refrigerant temperature between the cabin and tailcone is 35°F (1.7°C) or less. The second overpressure safety device is a fuse plug located on the receiver /dehydrator bottle. This plug will vent the system refrigerant safely overboard in the event of a system pressure in excess of 425 psig. The compressor motor is automatically cut out during engine start, STAB WING HEAT operation, and inflight when only one generator is operating. When the aircraft is on external power, the compressor motor is powered by 28 VDC supplied through a 175-amp current limiter connected to the battery charging bus and a power contactor. When the generators are operating, the compressor motor is powered by 28 VDC supplied through two power contactors and two 175-amp current limiters connected to the generator buses. A fault isolator will remove power from the compressor motor should a fault occur which causes the compressor load to become unequally shared between the generators (except during single generator operation on the ground).

System control circuits, including the cabin blowers, are powered by 28 VDC supplied through the 5-amp COOL CONTROL circuit breaker on the pilot's circuit breaker panel. The cabin blowers are powered by 28 VDC through a 50-amp current limiter. Speed control circuits for the

cabin blowers are powered through the 5-amp CABIN FAN circuit breaker on the copilot's circuit breaker panel. The cockpit blower (including speed control circuit) is powered by 28 VDC through the 15-amp CREW FAN circuit breaker on the copilot's circuit breaker panel.



(R-12 and R-134A Systems)
REFRIGERANT COOLING SYSTEM
Figure 6-12

CABIN CLIMATE SWITCHES *(R-12 and R-134A Cooling Systems)*

COOL-OFF SWITCH

The COOL-OFF switch, located in the CABIN CLIMATE group on the copilot's switch panel, controls the freon cooling system. When set to COOL, the switch allows power to the freon compressor motor and cabin and cockpit blower circuits. If either the CREW or CABIN FAN switch is off when the switch is set to COOL, the respective blower, cockpit or cabin, will run at minimum speed. Blower speed may be increased by rotating the CREW or CABIN FAN switch, as applicable, in a clockwise direction until the desired speed is reached.

CABIN FAN SWITCH

Cabin blower speed is controlled during cooling and supplemental air circulation modes by the rheostat-type CABIN FAN switch located in the CABIN CLIMATE group on the copilot's switch panel. Rotating the switch clockwise out of the off detent position will turn on the cabin blowers and blower speed will increase with further clockwise movement. Power must be supplied by an engine generator, ground power unit or APU. During pressurized flight (CAB AIR switch ON), cabin cooling is accomplished by pressurization airflow through the cabin evaporator.

CREW FAN SWITCH

The rheostat-type CREW FAN switch is located in the CABIN CLIMATE group on the copilot's switch panel. The switch controls the cockpit blower which is available for all ground and inflight cooling or air circulation modes. When the cooling system is in operation, the blower will force air through the cockpit evaporator to provide cooling or circulate air when the air circulation mode is selected. Air circulated by the cockpit blower is exhausted through the cockpit and cabin overhead eyeball outlets when they are rotated to the open position.

HOURMETER — COMPRESSOR *(Aircraft 60-174 & Subsequent and prior aircraft modified by SB 60-21-2 — Installation of Cooling System Compressor Motor Hour Meter)*

An hourmeter may be installed in the tailcone compartment to measure accumulated compressor usage time. The hourmeter is activated whenever the compressor motor is running. There is no separate circuit breaker installed with this installation.

AUXILIARY HEATING SYSTEM

An auxiliary heating system is installed to provide additional cabin and cockpit heating when desired. The COOL-OFF switch must be set to the OFF position in order to operate the cabin auxiliary heater. Power must be supplied by an engine generator, APU, or ground power unit. The AUX HT switch, on the copilot's switch panel, is used to control the system. The auxiliary heater control circuit is wired through the start cutout relay; therefore, the system is inoperable during engine start.

CABIN AUXILIARY HEAT

The cabin auxiliary heat is provided by two heater assemblies located in the cabin left and right overhead diffusers. The system utilizes the cabin blower to provide air circulation. The heater assemblies incorporate several thermostatic controls to cycle the heaters at approximately 170° F. The thermostatic controls of each heater are connected in series to each other; therefore, cycling of each heater occurs simultaneously. The cabin blower will start when either heater warms to approximately 75° F. An overheat monitor is installed to monitor the temperature of both heaters. If either heater exceeds approximately 300° F or a switching failure occurs, both heaters will be disabled. Maintenance action is required when the overheat monitor disables the system. Each heater incorporates a thermofuse which will melt and disconnect electrical power to that heater should an overheat condition occur. The system control circuit operates on 28 VDC supplied through the 7.5-amp AUX CABIN-CREW HEAT circuit breaker on the copilot's circuit breaker panel. The heater assemblies are supplied 28 VDC through two 50-amp current limiters. Operation of the cabin heaters is only available if the CAB AIR switch is OFF. During pressurized flight (CAB AIR switch ON), cabin heating is accomplished by pressurization airflow.

COCKPIT FLOORBOARD HEATERS *(Aircraft 60-067 & Subsequent and Prior Aircraft Modified by SB 60-21-5)*

The cockpit floorboard heater system provides direct contact heat for crew foot warming. There are four heaters, one located beneath each rudder pedal. Each heater contains two heater blankets and a temperature limiting circuit which controls temperature between 100°F and 130°F independently of the other three heaters. When the temperature of a heater reaches 103°F, a relay will remove power to the two heater blankets causing them to cool. The cockpit floorboard heater is controlled through the use of the AUX HT switch. The system control circuit operates on 28 VDC supplied through the 7.5 amp AUX CABIN-CREW HEAT circuit breaker on the copilot's circuit breaker panel.

AUX HT SWITCH

The auxiliary heating system is controlled through the use of the AUX HT switch located in the CABIN CLIMATE group on the copilot's switch panel. The switch has three positions: OFF, CREW and CAB & CREW. With the switch in the CAB & CREW position, the cabin heaters and blower will energize to provide cabin heat and the cockpit floorboard heaters (if applicable) will energize to provide cockpit heat. With the switch in the CREW position, only the cockpit floorboard heaters will be energized.

TAILCONE BAGGAGE COMPARTMENT HEATER SYSTEM

Tailcone baggage compartment heat is provided to keep the tailcone baggage compartment temperature between 35°F and 50°F. The BAGGAGE HEAT switch is located in the tailcone baggage compartment and is normally left in the ON position at all times. Some aircraft may be equipped with an optional baggage heat switch, located on the copilot's circuit breaker panel. The tailcone baggage heater elements are activated when either external power is connected, or at least one engine-driven generator is powering the electrical system, and the tailcone baggage heater switch is in the ON position. The tailcone baggage heaters are powered by 28 VDC through a 50-amp current limiter.

SECTION VII
INTERIOR EQUIPMENT

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SECTION VII
INTERIOR EQUIPMENT

COCKPIT DESCRIPTION

The instrument panel is readable by either crew member and the pedestal is accessible and readable by either crew member. Circuit breaker panels are located on the cockpit sidewalls. A magnetic compass is installed on the windshield center post. No switches (except dome light switches), instruments, or placards are located overhead. The pilot's and copilot's seats are adjustable forward, aft, and vertically. Life vest storage, in some installations, is provided behind each crew seat. On other installations, the life vests are installed in a pouch assembly added to the front of the crew seats. The pilot's and copilot's rudder pedals are adjustable forward and aft. A curtain, located behind the crew, may be closed for privacy or to darken the cockpit. A hand-held fire extinguisher is installed on the bulkhead behind each crew station at approximately shoulder height. A certificate holder is located just aft of the pilot's station. Air outlets are installed in each sidewall just aft of the armrest, in each kickplate adjacent to the outboard rudder pedals, on the front side of the center pedestal *(on aircraft 60-174 & subsequent)*, and in the headliner above each crew station. An ashtray and drink holder is installed on each side just forward of the circuit breaker panels. Storage is provided as follows: pouches installed on the underside of the glareshield on each side, pouches attached to the lower part of each circuit breaker panel, Jeppesen-size manual holders located at the forward lower edge of each circuit breaker panel, checklist holders located on the side of the pedestal at each crew station, and storage compartments attached to each sidewall outboard of each crew seat. Oxygen masks will be stored in a stowage cup just aft of the pilot and copilot's seat or in an accessible compartment just aft of the pilot's and copilot' s circuit breaker panel. A crew member PBE (protective breathing equipment) is stored in a box accessible to the crew (typically on the aft end of the pedestal). Map lights are installed in each sidewall above the circuit breaker panels and dome lights are installed in the headliner on each side. A work table is installed above the circuit breaker panels at each crew station. Each table hinges enabling it to be stowed against the sidewall when not in use. Sunvisors are installed in tracks at the upper edge of the windshield at each crew station and pull-out extensions are available at the outboard corners of the glareshield. An assist handle, installed overhead, provides a handhold for improved cockpit access.

COCKPIT SEATS

The crew seats (figure 7-2) are comprised of two basic structures; the upper structure containing the controls to adjust the headrest, recline, and lumbar support and the base structure containing the controls to adjust the thigh pad, seat height and seat horizontal position.

The seat belt system inertia reel is attached to the rear of the seat back. The seat belt reel lock is located on the outboard side of the seat, below and to the rear of the armrest. To lock the seat belt reels, push the reel lock handle down. For automatic reel control, move the reel handle up. The lap straps and crotch strap are mounted on the seat pan.

Seat height adjustment is accomplished by pressing a button on the height lock handle on the outboard side of the seat. When the button is pressed and handle pulled up, the seat will raise. When the button is pressed and the handle pushed down, the seat will lower. Release the button at the desired height to lock the seat into place.

Seat tracking is made with the track handle on the inboard side of the seat. Moving the handle aft will allow the seat to be moved forward and aft as desired. Release the track handle to lock the seat track into place.

The headrest may be adjusted for angle by moving the headrest to the right and rotating it to one of eight possible lock positions.

The back cushion/lumbar support adjustment is controlled by two handwheels, one on each side of the seat. The handwheel on the outboard side of the seat controls the up/down movement, the inboard handwheel controls the in/out movement. Full up/down movement of the back cushion is obtained within 3 1/2 turns of the handwheel and full in/out movement of the back cushion is obtained within 2 3/4 turns of the handwheel.

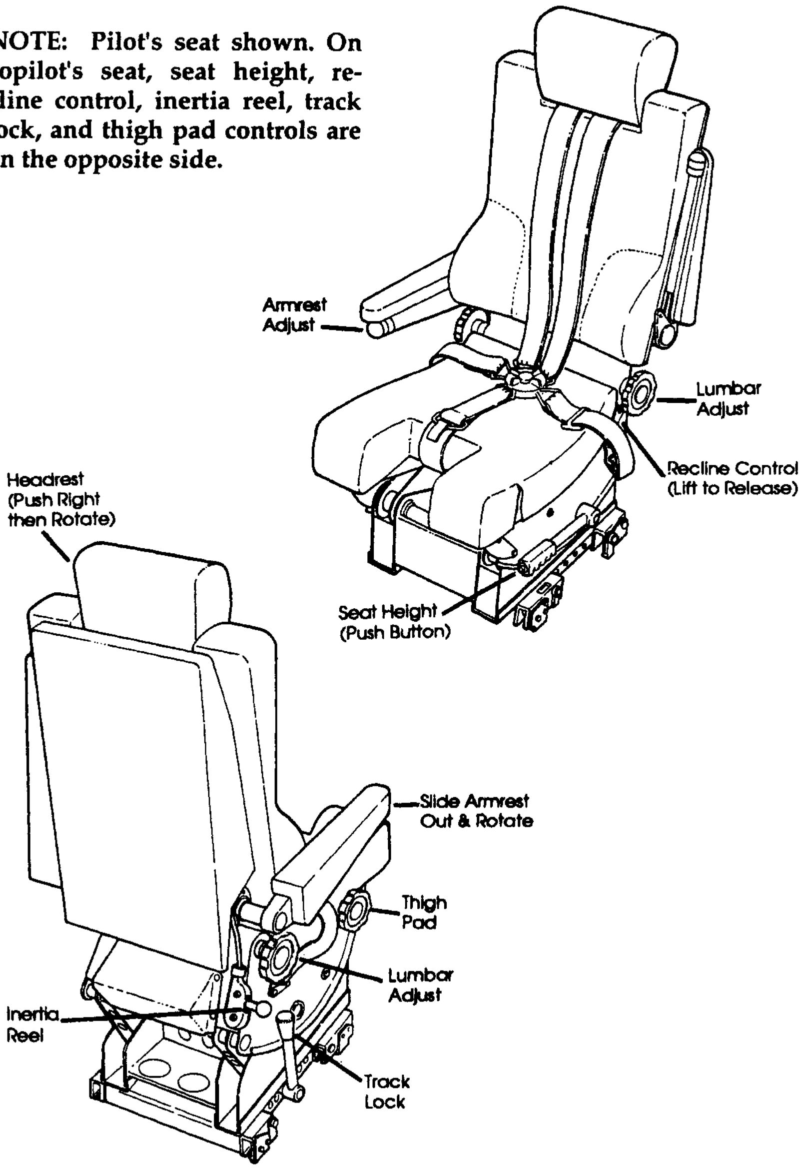
The armrests are padded and can be individually adjusted. Each armrest has an adjusting knob at the forward end of the arm. When either knob is turned counterclockwise, the armrest will lower. When either knob is turned clockwise, the armrest raises. The armrests can be folded back and pushed in towards the seat spine to facilitate entry and exit to the seat. Slide the armrest out and rotate down for use.

COCKPIT SEATS (CONT)

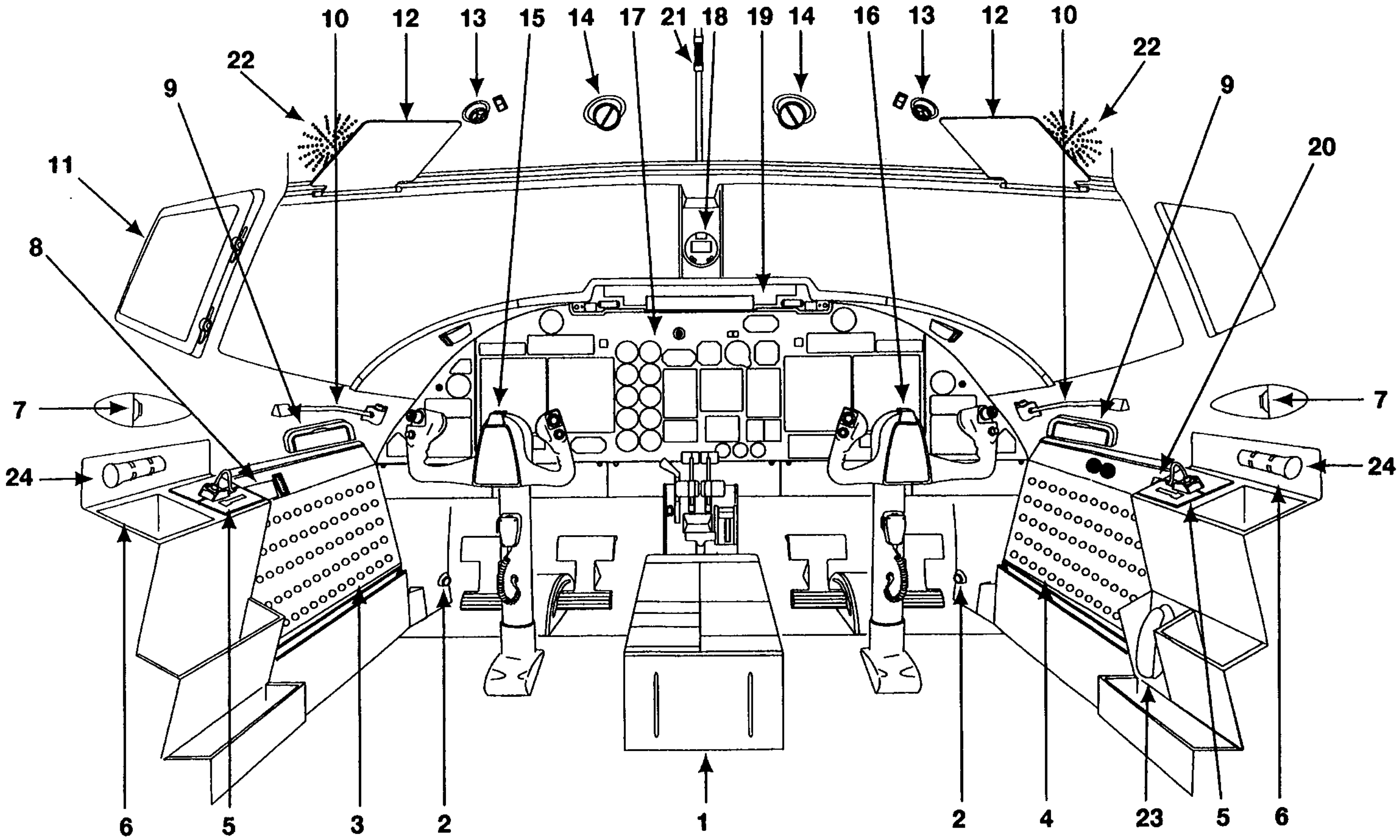
Thigh support pad adjustment is accomplished by turning the thigh pad adjusting handwheel located on the inboard, center section of the seat pan. Rotate the knob forward to raise the thigh pads, and rotate it backward to lower them. When the seat occupant uses the foot controls, thus putting pressure on the thigh pads, tension springs within the linkages are overridden allowing either thigh pad to be pushed downwards. When the thigh pad pressure is released the thigh pads return to their pre-set position.

The recline control lever is located on the outboard side of the seat below the lumbar support adjustment. Seats may be reclined to a maximum of 35°.

NOTE: Pilot's seat shown. On copilot's seat, seat height, recline control, inertia reel, track lock, and thigh pad controls are on the opposite side.



COCKPIT SEAT (TYPICAL)
Figure 7-1



1. Pedestal & Throttle Quadrant
2. Air Outlet (ankle)
3. Pilot's Circuit Breaker Panel
4. Copilot's Circuit Breaker Panel
5. Crew Oxygen Mask
6. Smoke Goggle Storage
7. Air Outlet (shoulder)
8. Oxygen Controls & Mic/Phone Jack Panel
9. Foldout Work Table
10. Map Light
11. Openable Window
12. Sunvisor
13. Dome Light
14. Overhead Air Outlet
15. Pilot's Control Column & Wheel
16. Copilot's Control Column & Wheel
17. Instrument Panel
18. Magnetic Compass
19. Annunciator Panel
20. Copilot's Mic/Phone Jack Panel
21. Assist Handle
22. Cockpit Speakers
23. Cockpit Phone
24. Flashlight

GENERAL ARRANGEMENT — COCKPIT
Figure 7-2

CABIN DESCRIPTION

The aircraft cabin is divided into three areas: the passenger area, the lavatory, and the cabin baggage compartment. Access to the baggage compartment may be accomplished through the cabin or through the emergency exit/baggage door on the right side of the fuselage. The lavatory is located in the aft cabin immediately forward of the baggage compartment. Individual reading lights, air outlets, and passenger oxygen masks are located in the overhead convenience panels above the seats.

PASSENGER SEATS

Lap belts are included in each passenger seat (figure 7-3). Optional shoulder harnesses for three-point latching is available. Passenger seats do not have break-over backs.

A life vest is stowed in a pocket under each seat bottom. Access is through a panel on the front of the seat above the storage drawer.

Passenger seats can be swiveled 360° but normal aircraft installation is limited to 180°. Seats have lateral tracking on the seat base which allows them to be positioned as far outboard as possible for take-off and landing, thus maintaining maximum aisle clearance. Seat tracking or swivel is accomplished by lifting on the inboard release handle on the inboard armrest. Optional floortracking is accomplished by lifting on the release handle near the base of the seat.

Passenger seat backs may be reclined to a maximum of 30° with a mechanical button on the outboard armrest. The optional berthing position is available which allows the seat to go full flat.

Seats certified for aft facing take-offs and landing will be equipped with hidden "bread board" headrests which can be pulled up for use or stowed into the top of the seat.

Inboard armrests may be moved down by pulling up slightly on the armrest and allowing it to lower. Outboard armrests have an optional feature to be stowed as well. Armrest(s) may be raised and locked into place by pulling the armrest up until it clicks into place. Armrests may be either up or down for take-off and landing.

CAUTION Do not sit on the armrests since this could cause damage to the internal latching device.

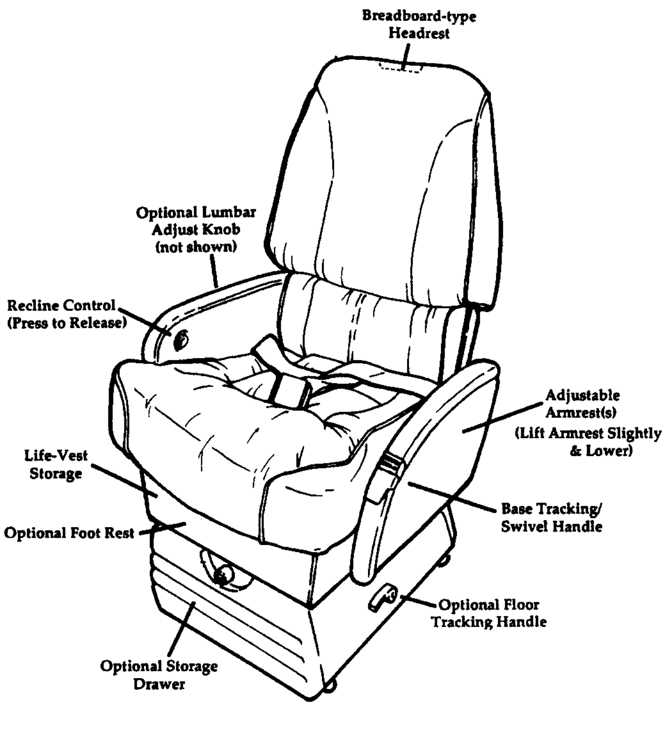
PASSENGER SEATS (CONT)

Storage drawers may be located below each seat and are accessed by pulling the knob on the front of the drawer. These drawers are held shut by friction latches at the back of the drawer.

Passenger seats may be equipped with a recliner-style footrest that is located above the storage drawer. When desired, the footrest can be pulled out for use.

Fire blocking of seat cushions is an optional feature to meet FAR Part 25 requirements.

Passenger seats may include an optional mechanical lumbar support adjustment knob on the outboard side of the seat back. Rotating the knob forward moves the lumbar support outward thus providing lower back support.



PASSENGER SEAT (TYPICAL)
Figure 7-3

EMERGENCY EQUIPMENT

CABIN BAGGAGE COMPARTMENT SMOKE DETECTION

A baggage area smoke detection system is installed to provide the crew with visual warning of a possible fire in the cabin baggage compartment. The system receives power from the 3-amp CABIN FIRE DETECT circuit breaker on the copilot's circuit breaker panel. If the smoke detector, located in the aft cabin baggage area, senses smoke in the aft cabin baggage or lavatory area, a signal is transmitted to an amplifier which will illuminate the red CABIN FIRE light on the glareshield annunciator panel. When the smoke clears, the light will extinguish. The cabin smoke detection system is operative during EMER BUS mode. Self test of the smoke detector is accomplished by pressing the annunciator light test switch. Illumination of the CABIN FIRE light indicates a successful self test.

SMOKE GOGGLES

Smoke goggles are provided for each crew member and are stowed in sidewall compartments just below the flashlight holder. The goggles must be donned should smoke or fumes be present in the aircraft. Refer to the AFM for the specific procedures.

HAND FIRE EXTINGUISHER

Halon 1211 fire extinguishers are installed for cockpit and cabin fire protection. The fire extinguishers, in some installations, are attached to the bulkheads just behind each crew station at approximately shoulder height. On other installations, the fire extinguishers may be attached just aft of the pedestal in the cockpit area. A fire extinguisher is also located next to the lavatory seat under the arm rest. The extinguishers incorporate a pressure gage which indicates the state of propellant charge. If properly charged, the indicator needle will be within the green segment. When an extinguisher has been manually discharged, the indicator will be in the red area. This provides the crew with visual indication that the bottle has been partially or totally discharged. The bottle takes approximately 10 seconds to fully discharge. The extinguishers are rechargeable.

PROTECTIVE BREATHING EQUIPMENT

Protective breathing equipment (PBE) is available for a crew member to use in fighting cabin fires. The PBE is designed to protect the user's eyes and respiratory system from the harmful atmosphere which may be generated by a cabin fire. The PBE is a hood with a visor which is placed over the head and seals around the neck. An oxygen-generating canister provides breathing oxygen for the user. The PBE is vacuum sealed in a bag and stored in a box accessible to the crew. The PBE is a throw-away unit that must be replaced whenever the vacuum seal has been broken. It is imperative that the vacuum seal be maintained since the oxygen-generating chemicals react with moisture.

Duration of oxygen production is nominally 15 minutes depending upon the work rate and size of the user. Useful life of a sealed PBE is 10 years from date of manufacture.

NORMAL OPERATION

Donning the PBE:

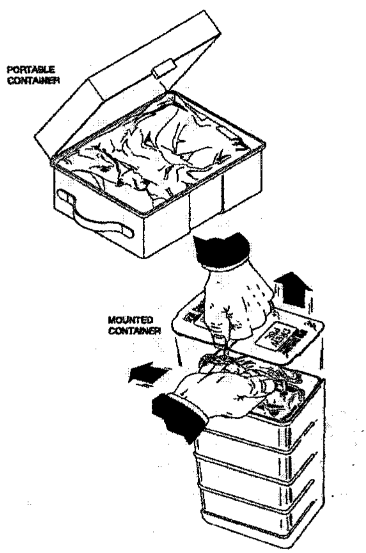
There are two available carriers for the PBE. A portable container stored in a cabinet behind the cockpit or a mounted container (normally mounted to the aft side of the pedestal).

1. Removing mask from container.
   a. To open the portable container, lift the single latch on the cover and lift. Remove sealed bag from the container.
   b. On the mounted container, grasp the red access handle on the protective container firmly and pull forcible to disengage the cover. When the cover is removed from the container, immediately drop it. (The vacuum sealed bag does not need to be removed from the container to open.) The packaged unit may be removed from the stowage container prior to opening and carried to a remote location for use.
2. To remove the PBE from the vacuum sealed bag, locate the red I.D. tag and pull sharply to tear open the vacuum sealed bag. Reach into the opened vacuum-sealed bag and firmly grasp the PBE. Pull the PBE straight out of the bag. If necessary hold the bag with the opposite hand.
3. Place both hands inside the neckseal opening with palms facing each other and PBE visor facing downward with the oxygen-generating canister resting on the tip of the hands.
4. With the head bent forward, guide the PBE neckseal over the top of the head and down over the face using the hands to shield the face and glasses from the oronasal mask cone.

5. With both hands, grasp the adjustment straps at the lower corners of the visor and pull outward sharply to actuate the starter candle. Within 1-5 seconds, a rushing noise of oxygen entering the hood will be heard and inflation witll be evident.

WARNING Human hair is highly flammable. Hair that protrudes through the neckseal could ignite if brought into direct contact with flame.

6. With the straps still in hand and head bent forward, pull backward to secure the oronasal mask cone high on the nose for a tight seal.
7. If wearing glasses, you may adjust their position to rest on tip of the oronasal mask cone by moving the sides of the frame through the hood fabric. Do not attempt to adjust through the neckseal as this will result in infiltration of the surrounding atmosphere into the interior of the hood.
8. When the neckseal is positioned at the neck and the oxygen-generating canister is resting on the nape of the neck, remove the hands, checking to see that clothing is not trapped in the seal and hair does not protrude between the seal and the neck. Pull the protective neck shield down to cover the collar and upper shoulder area.

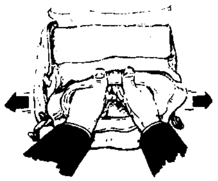


STEP 1

Grasp red access handle and pull forcibly to disengage the cover. Locate red I.D. tag and pull sharply to tear open vacuum-sealed bag.

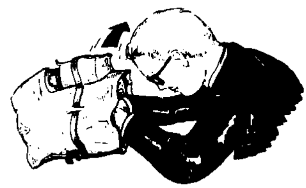
STEP 2

Pull PBE out of vacuum-sealed bag and shake hood open.



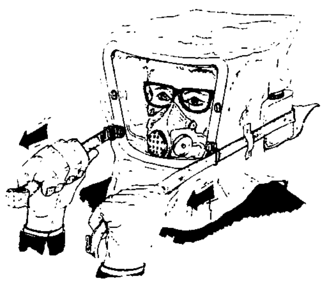
STEP 3

Place both hands inside the neckseal opening with palms facing each other and PBE visor facing downward with the canister resting on tip of hands.



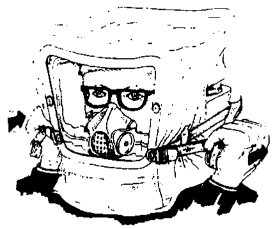
STEP 4

With the head bent forward, guide the PBE neckseal over the tip of the head and down over the face using the hands to shield the face and glasses from oronasal mask cone.



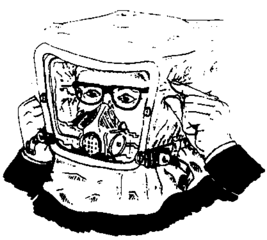
STEP 5

With both hands, grasp the adjustment straps at the lower corners of the visor and pull outward sharply to actuate the starter candle.



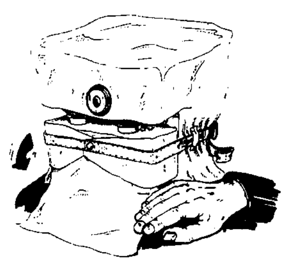
STEP 6

With the straps still in hand and head bent forward, pull backward to secure the oronasal mask cone high on the nose for a tight seal.



STEP 7

If wearing glasses, you may adjust their position to rest on top of the oronasal mask cone by moving the sides of the frame through the hood fabric. Do not attempt to adjust through the neckseal as this will result in infiltration of the surrounding atmosphere into the interior of the hood.



STEP 8

When the neckseal is positioned at the neck and the canister is resting on the nape of the neck, remove the hands, checking to see that clothing is not trapped in the seal and hair does not protrude between the seal and the neck. Pull the protective neck shield down to cover the collar and upper shoulder area.

Following actuation, the hood will inflate over a 15-20 second period. After this period, the starter candle will cease flowing and the only sound will be slight rustling of the fabric on each inhalation and exhalation. Dependent upon breathing rate, there will be a slight exhalation resistance as the exhaled breath is forced through the oxygen-generating canister. Inhalation resistance will be almost unrecognizable since inhalation is directly from the interior of the hood through a diaphragm type check valve located at the base of the oronasal mask. The visor should remain clear of fogging or misting. Heat is produced by both the chemical air regeneration process and transfer of body heat during the rebreathing cycle. Heat build-up within the hood is normal and is dependent upon the amount of work performed. There should be no irritating or strong unusual odors within the hood. Operational duration is variable dependent upon the amount of work performed by the user.

If the PBE is worn to exhaustion of the chemical regeneration system, this will be evidenced by a gradual reduction in the expended volume of the hood until the point that the hood is collapsed tightly around the head at the end of a full inhalation. Additionally, there will be a rapid buildup of heat and moisture in the hood as the canister looses its effectiveness. At this point, the wearer should immediately retire to a safe breathing area clear of flame and toxic fumes and remove the device.

Removing the PBE:

1. Go to a safe area away from immediate contact with fire or open flame and/or toxic fumes.
2. With both hands, reach for the two lower corners of the visor area and push forward on the metal tabs of the adjustment strap buckles to release the strap tension.
3. Place both hands under the neckseal in forward area and pull up, guiding the oronasal cone and neckseal over the face/glasses until the PBE is clear of the head.
4. Place the expended PBE in a safe place to cool away from fire or exposure to water.

Disposal:

The expended PBE still contains unreacted oxidizing material and strong alkali materials. At the completion of flight, it must be turned over to maintenance for authorized disposal.

ABNORMAL CONDITION OF OPERATION

Caution: This device produces oxygen which will vigorously accelerate combustion. Do not intentionally expose the device to direct flame contact, or remove in the immediate presence of fire or flame. Due to oxygen saturation of the hair, do not smoke or become exposed to fire or flame immediately after removing.

Users should be trained to recognize abnormal conditions which could signify malfunction or failure of the equipment to properly operate.

Failure of the starter candle:
If the starter candle fails to actuate when the adjustment strap is pulled, an additional sharp pull on the strap may be sufficient to dislodge the lanyard pin and actuate the device. If the device still fails to actuate, the hood will continue to function, although the initial purge capability is lost. Sticking the fingers into the neckseal to allow a large lung inhalation may be required to enable sufficient breathing volume until the chemical regeneration system begins producing a surplus of oxygen.

Inadequate oronasal mask seal:
Absence of a tight seal of the oronasal cone to the face may result in excess leakage of the exhaled breath into the hood, short circuiting the oxygen-generating canister. This condition may result in a build-up of CO_2 within the rebreathing volume in the hood. Excessive CO_2 is normally indicated by breathing distress such as rapid and labored breathing accompanied by a general feeling of insufficient ability to get one's breath, although there is no restriction to breathing. Presence of moisture or fogging on the visor and the sensation of air escaping from the mask, particularly around the nose and eyes are indications of a lack of proper fit. Adjustment of the mask straps and mask position to minimize leakage should rapidly alleviate the problem. If the perception of breathing distress persists, the user should quickly go to a safe area and remove the PBE and don alternate breathing equipment if required.

Loss of infiltration seal:

The smoke and toxic fumes generated by the combustion of most aircraft cabin interior materials has many strong irritants. The continued presence of strong irritation odors inside the hood resulting in eye and respiratory tract discomfort is a good indicator of the lack of an effective infiltration seal. Verify that the seal is in contact with the skin or the neck and does not have clothing or jewelry trapped in the seal, or hair protruding between the seal and the neck. If the condition persists, or there is evidence of a tear in the neckseal, the user should quickly go to a safe area and remove the PBE and don alternate breathing equipment if required.

FLOTATION EQUIPMENT

Pilot's and copilot's life vests are either stowed in a pocket on the pilot's and copilot's seat back or in a pouch assembly on the front of the pilot's and copilot's seats. Life vests in the passenger cabin are stowed in a compartment under each passenger/cabin seat. There is also a life vest stowed in the armrest next to the aft lavatory toilet seat. The life vests are inflated by pulling the red CO_2 release tabs.

MISCELLANEOUS EQUIPMENT

CREW COMPARTMENT

FLASHLIGHTS

Flashlights are located either on the Jeppesen storage units or on the sidewall next to the pilot's and copilot's seats. The optional rechargeable flashlights are waterproof, flame retardant, and floatable.

Three flashlight installation options are available: rechargeable flashlights may be installed with a recharging base; user provided flashlights may be secured with hook and loop tape or mounted on a two-point retention bracket. The retention bracket and hook and loop tape act as a storage mount for any appropriately sized flashlight. Except for the recharging base, no aircraft provided recharging capability is available with the hook and loop tape or retention bracket assembly configurations. An optional 120 VAC adapter is available with the rechargeable configuration for use in an office or home outlet. When the flashlights are recharged they could then be transferred to the retention brackets or hook and loop tape installations onboard the aircraft.

If a recharging base is used, the flashlight must be properly placed in the retention bracket for recharging. Ensure the "D" ring is properly secured into the flashlight end cap. Place the head end of the light against the retaining disc at the top end of the bracket with the switch toward the bracket and the small red LED light facing out. Once the head of the flashlight is positioned, snap the butt of the flashlight into the clips at the bottom of the bracket. When the flashlight is recharging, the LED light should be on. To remove the flashlight from the bracket, grasp and pull the lower end of the light out of the bracket clips. Do not install the flashlight into the recharging base while the flashlight is still turned on since recharging and lamp life would be significantly reduced.

The lamp inside the flashlight may need to be changed after approximately 20 hours of service. To change the lamp, unscrew the head of the light and remove the lens cap and reflector assembly. Remove the lamp from the reflector by unscrewing the threaded plastic retainer. Insert the new lamp and replace the retainer. Be sure to re-install the spacer/washers to retain its highly focused lighting ability. Do not touch the shiny surface of the reflector or the glass portions of the lamp. If the reflector surface requires cleaning, use only a soft, dry cloth.

FLASHLIGHTS (CONT)

For the rechargeable configuration, the useful life per charge of the flashlight is approximately 45 minutes and requires about 16 hours to recharge after a full battery depletion. Leaving the flashlight on constant charge in extreme temperatures (below 30°F and above 100°F) could affect the useful life of the battery pack. The flashlights recharge only when an aircraft battery switch(es) is turned on. The power source for the recharging base, if installed, is 28 VDC through the 1-amp FLASH LTS circuit breaker on the copilot's circuit breaker panel.

CREW WORK TABLE

A fold down work table, with hinged leaf, is located in the outboard panel adjacent to each pilot's seat. The table is folded out of its compartment by the available finger hold at the top edge of the panel compartment. Unfold its leaf for use. To stow the table fold the leaf up and push the table back into its compartment.

CHECKLIST HOLDER

A one-piece checklist holder is installed on the floor on each side of the forward pedestal. It can hold the checklist and prevent it from becoming displaced during flight.

SUNVISOR

Each pilot has a sunvisor located at the upper edge of the windshield. Each sunvisor is hinged so that it can be folded down and slid along its track as desired. Some aircraft may have pull-out extensions available at the outboard corners of the glareshield.

PILOT'S OPENABLE (SIDE) WINDOW *(Aircraft 60-001 thru 60-235)*

The pilot's side window includes aft hinges and forward edge latches and can be opened inward to facilitate direct communication with ground crew personnel. The aircraft must be depressurized before the window will open properly. To unlock the window, rotate the two latches, located near the top and bottom forward edge of the window, approximately 90° out of their striker plates. Pull the forward edge of the window inward. The window is closed by pushing the window back into the frame and locking it by securing the two latches firmly into the striker plates.

PASSENGER COMPARTMENT

CABINETS, DRAWERS & TABLES

Several cabinets, drawers and tables may be built into the passenger compartment. Due to the wide variety of options available, the following descriptions and figures show only the most common accessories. Cabinet lights are actuated through micro-switches in the cabinet doors. Power for the cabinet, decanter, and kicker lights in the forward left-hand and right-hand cabinets as well as the optional aft pyramid cabinet lighting is 28 VDC through the 7.5-amp CABINET LTS circuit breaker on the pilot's circuit breaker panel.

Cabinets and drawers available at the forward, left-hand refreshment station (figure 7-5), from top to bottom, are as follows. Access is through press-to-open buttons on the cabinet doors or drawers.

1. Top cabinet contains two, vented, stainless steel, 1.5 gallon removable liquid dispenser containers. These insulated containers incorporate a heating element along the bottom of the unit and are automatically plugged into a power source when installed in the cabinet. An over-temperature sensor is built into the circuit in addition to a thermostat built into the bottom, rear of the container, which will keep even small amounts of liquid warm without burning the container.

   The containers are removed by opening the top and middle cabinet doors and pulling down the dispenser button panel (figure 7-4) located in the upper section of the middle cabinet. The dispenser button panel is held into place with ball-catcher hinges. Remove the dispenser by pulling it straight out from the cabinet. The containers can be drained through the screw on/off cap on the top of the unit, by pressing the spigot and allowing fluids to drain, or unscrewing the outside spigot ring and removing the spigot. The container is filled through the top cap. To reinstall the container, ensure the cap is screwed on tightly, and push the container completely into the cabinet, thus connecting the heating element to its power source. Flip the dispenser button panel over the spigot outlets before closing the top and middle cabinet doors.

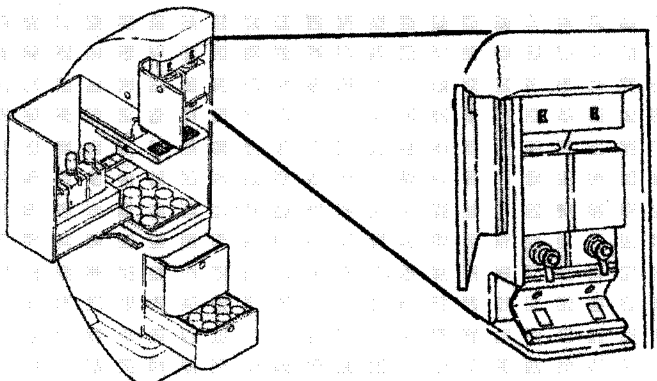
   A lighted On/Off liquid warmer toggle switch is located above each dispenser container. With at least one battery switch on, and a warmer switch pressed ON, one-half of the rocker switch will illuminate red and the warmer will keep already hot liquids between 150 and 170°F. When the switch is turned off, one-half of the rocker switch will illuminate blue, and power is turned off to the warmer.

CABINETS, DRAWERS & TABLES (CONT)

The warmers are not able to heat cold liquids to very warm temperatures. Before installing the dispenser in the airplane, and to aid in sustaining hot liquids, it is recommended that very hot tap water be poured into the container. Install the lid and allow the container to preheat for approximately 15 minutes. Drain the hot water and add whatever hot beverage is desired. If desired, cold liquids may be available by not turning on the applicable warmer.

To serve liquids from the dispenser, position a cup under the desired liquid dispenser. Press the dispenser button which, in turn presses the spigot drain. A small drip pan below the dispenser outlets will catch small amounts of overflow.

Power to these warmers is 28 VDC through the 10-amp HOT CUP circuit breaker on the pilot's circuit breaker panel.



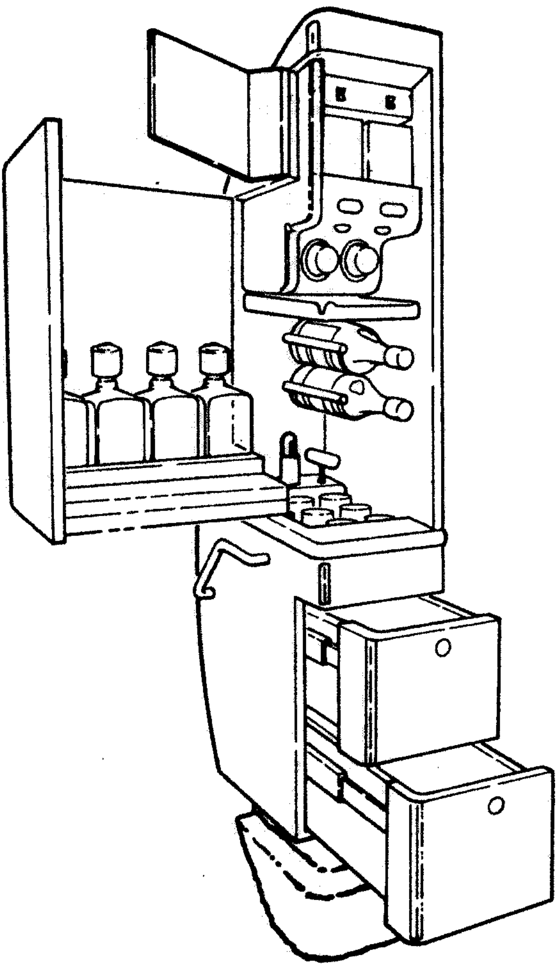
DISPENSER CABINET
Figure 7-4

The large, middle compartment contains door-mounted decantor storage with press-to-extend counter top, two horizontal bottle holders, glass rack, condiment and napkin tray, two press-to-fill liquid dispensers and two disposable cup holders mounted horizontally immediately under the liquid dispensers. When the access button is pressed to the cabinet, the door catch is released and two plungers in the door jamb help push the door outward. A third plunger in the door jamb is the microswitch that activates the decantor and cabinet lights.

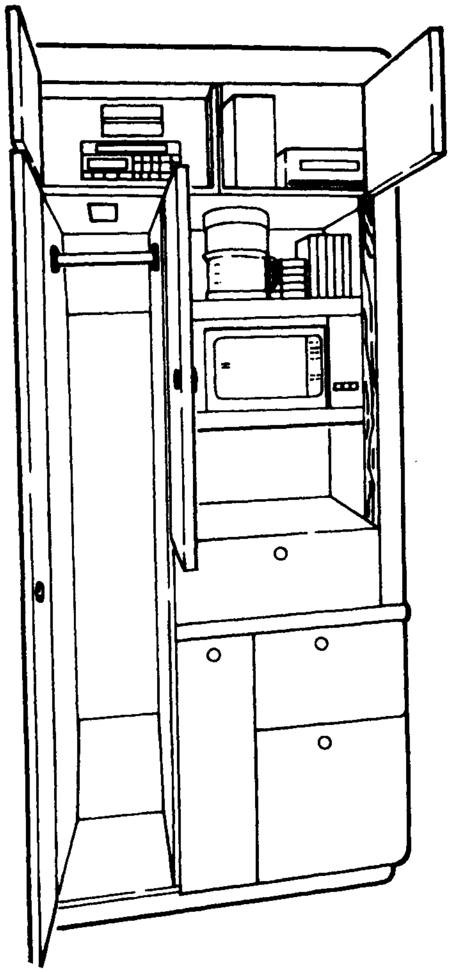
Two slide-out drawers with storage and ice liner are located below the large, middle compartment. Drainage for the ice container is provided through a drain valve on the underside of the cabinet. To drain the container, rotate the valve handle (located underneath the bottom slide out drawer) clockwise so that the handle is in the vertical position. The

CABINETS, DRAWERS & TABLES (CONT)

water will drain out through the forward cabinet drain mast. The drain mast is heated to prevent ice build up around the drain hole. To close the drain valve, rotate the handle counterclockwise so that the handle is in the horizontal position.



FORWARD LEFT-HAND REFRESHMENT CABINET (TYPICAL)
Figure 7-5



FORWARD RIGHT-HAND GALLEY CABINET
(TYPICAL)
Figure 7-6

CABINETS, DRAWERS & TABLES (CONT)

Cabinets and drawers available at the forward, right-hand galley/entertainment center (figure 7-6), from top to bottom, are as follows. Access is through press-to-open buttons on the cabinet doors or drawers. An aneroid switch will disconnect power to the microwave oven, coffee maker (if installed), espresso maker (if installed), VCP (video cassette player), VCR (video cassette recorder) (if installed), video monitor and AC outlet (if installed) if cabin altitudes exceed 9500 (±250) feet. Power will be restored if normal cabin altitude is regained.

The top two side-by-side compartments may be equipped with a stereo and cassette/compact disc player, shelves for storage of compact disks or cassette tapes, and VCP or VCR. An optional wine storage cabinet in this cabinet can be equipped with ducted cooling air that is routed from the cabin air conditioning system. With the COOL-OFF switch (copilot's switch panel) in the COOL position, an air gasper can be rotated closed or open to allow cooling air to enter this cabinet.

The large, middle compartment is available for storage of a coffee maker (if installed), an espresso maker (if installed), and a microwave oven. Lighted rocker switches inside the cabinet must be turned on before either will operate. These switches will not allow power to both the microwave and coffee maker simultaneously. Power for the coffee maker and microwave oven is 115 VAC supplied by a 28 VDC to 115 VAC, 60 Hz inverter. The COFFEE MAKER and MICROWAVE OVEN circuit breakers, on the copilot's circuit breaker panel, are used to remotely control the 115 VAC output of this inverter.

An optional jump seat may be installed in the right forward galley. The jump seat is accessed by sliding the seat out and lifting the back up.

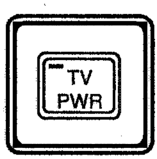
An optional video (TV) display monitor may be installed in conjunction with a video player and/or Airshow display. An optional tuner may also be installed to receive ground-based television stations. The display faces aft from the right-hand, forward cabinet. On some aircraft, the video monitor may be turned on with the TV PWR switch on the aft side of the forward right-hand cabinet or from the cabin control panel, located adjacent to one of the passenger armrests (figures 7-7 and 7-8). On other aircraft, the display may be turned on by the remote control unit. Once the display monitor and VCP/VCR are turned on, video functions may be operated directly from the VCP/VCR or an optional remote control unit.

CABINETS, DRAWERS & TABLES (CONT)

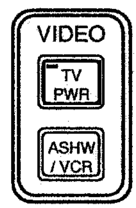
The remote control cannot control volume. Audio is engaged by pressing AUDIO on the VCP/VCR control head. Page through the audio menu on the TV monitor and select Hi-Fi when displayed. Check the correct audio mode is selected by pressing DISPLAY. The desired selection should appear on the screen. VCP/VCR audio may now be selected on the cabin speakers or individual headphones using the appropriate audio select switches (refer to STEREO SYSTEM).

An optional Sharp Video Display may be installed. It is a 10.4 inch Liquid Crystal Display (LCD) which may interface with a VCP/VCR and/or Airshow 200 or 400 Cabin Display.

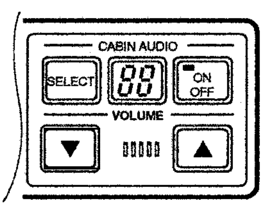
Power to the VCP is 28 VDC through a 5-amp VIDEO circuit breaker on the pilot's circuit breaker panel. Power to the video monitor depends on the model installed. The Sony video monitor receives 115 VAC through a 1-amp circuit breaker and 28 VDC through a 5-amp VIDEO circuit breaker on the pilot's circuit breaker panel. The Sharp video display receives 28 VDC through a 5-amp VIDEO circuit breaker on the pilot's circuit breaker panel.

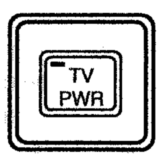


PANEL ON FWD, RH CABINET
WITHOUT AIRSHOW MODE

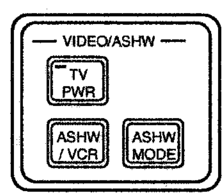


PANEL ON FWD, RH CABINET
WITH AIRSHOW MODE





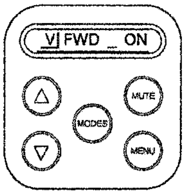
CABIN CONTROL PANEL
WITHOUT AIRSHOW MODE



CABIN CONTROL PANEL
WITH AIRSHOW MODE

(Aircraft 60-001 thru 60-103)
TV-AIRSHOW CONTROL SWITCHES
Figure 7-7

CABINETS, DRAWERS & TABLES (CONT)



(Aircraft 60-104 and Subsequent)
TV-AIRSHOW CONTROL
Figure 7-8

Three slide-out storage drawers, one containing an ice liner, are available below the large, middle compartment. A storage drawer with slide-back work surface is located below the large cabinet. The slide-back work surface is incorporated in the top of the drawer. The drawer will lock into place when fully extended. To gain easy access to the drawer, push the work surface back with the available finger nook at the front of the surface counter. To unlock and stow the drawer, slide the work surface fully in over the drawer, press both latches on the outside lower corner tracks, and push the drawer into the cabinet.

One drawer is configured for a removable trash container with spring-loaded push down door on a removable lid. The drawer is accessed by pushing the button on the top, center section of the drawer and sliding the drawer out. The spring-loaded lid will pop up after it clears the cabinet edge. The trash container may be removed by pulling the drawer as far inboard as possible, lifting off the cover lid, and pulling the container straight up by the handles on both sides of the container. No cigarettes, matches, or otherwise flammable materials, should be discarded in the trash container.

A tall, narrow compartment forward of these units contains a coat rod and is available for storage. Automatic overhead lighting is activated through a microswitch in the door.

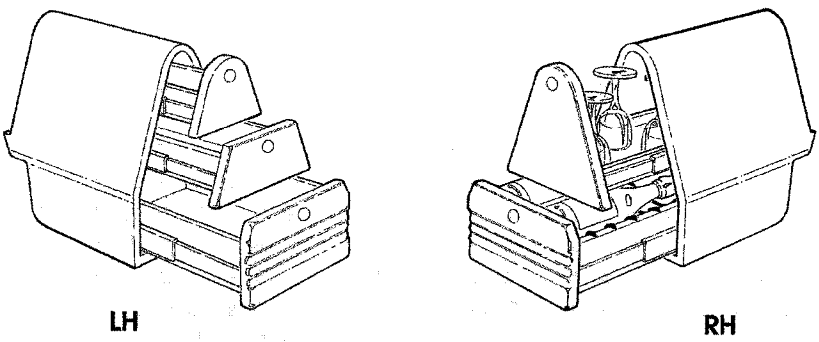
Sidewall Storage Boxes

Headphones, as well as other items, may be stored in the outboard sidewall storage boxes located along the cabin armrests.

Mid-Ship Cabinets

Optional mid-ship cabinets (figure 7-9) may be located between the forward and aft-facing seats on both sides of the aisle. One drawer may be

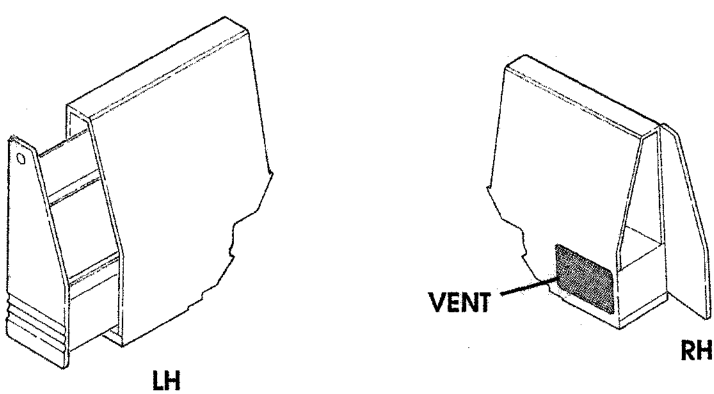
configured to securely store wine glasses or incorporate an optional ice liner to hold wine bottles. Access is by pressing the button at the top, center section of each panel drawer.



MID-SHIP CABINETS (TYPICAL)
Figure 7-9

Optional aft pyramid cabinets (figure 7-10) may be located behind the aft seats. Access is by pressing the button at the top, center section of each door panel. The right-hand cabinet door opens outward for miscellaneous storage. It also incorporates a venting panel near the floor which must not be blocked. This return-air vent is connected to the aft baggage compartment and is used during decompression.

The left-hand cabinet contains a magazine rack that slides inboard when the cabinet latch is pressed. Both cabinets may include two lights on top of each cabinet that illuminate the rear bulkhead wall.



AFT PYRAMID CABINETS (TYPICAL)
Figure 7-10

Tables

A pull-out, bi-fold desktop (figure 7-11) may be located in the panel in front of the forward right-hand seat. The desktop is pulled up and away from the wall and the leaf unfolded for use.

If a divan is installed in place of the seat, a cabinet with a fold-out table may be installed in lieu of the desktop table. The table is accessed by pressing the button to open the compartment door, pulling the table inboard and unfolding it up. To stow the table, fold the table leaf back onto the drawer, fold the table into the access structure, and press the tab on the top rear of the table-cabinet connection which releases the lock, thus allowing the table to be stored back into the cabinet.

Two pull-out, bi-fold card tables (figure 7-11) are available in the sidewall between the aft and middle seat locations. The card table is pulled up and away from the wall and the leaf unfolded for use.

When the optional bi-fold hexagon shaped bridge table is connected to the foldout card tables, it creates a full width table. When not in use, it is folded and stored in the aft partition in front of the vanity.

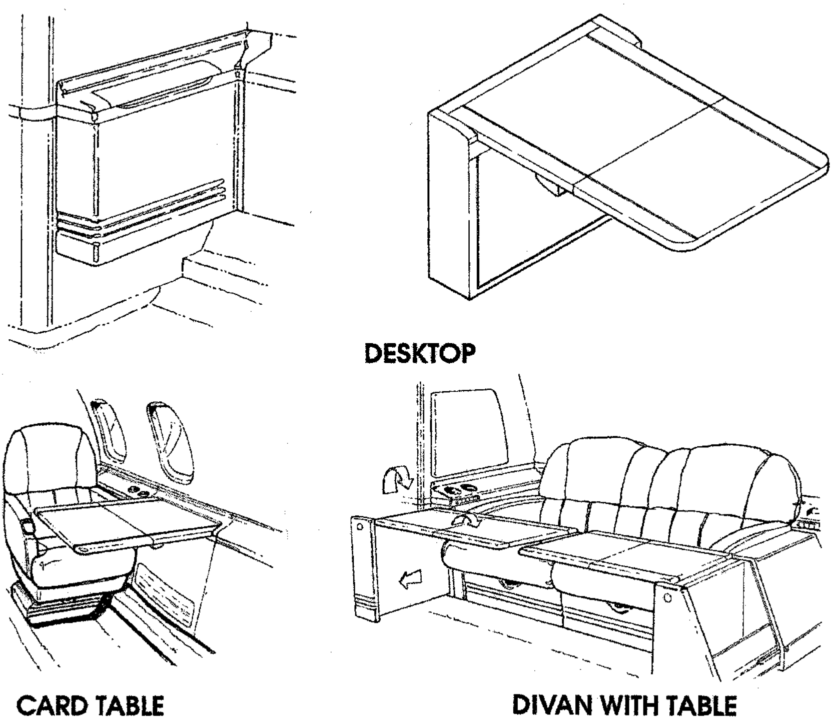


TABLE INSTALLATIONS (TYPICAL)
Figure 7-11

STEREO SYSTEM

A stereo system provides an audio signal from locally broadcast AM and FM radio frequencies, ADF, VHF 1 or 2, VCP/VCR or cassette/ compact disk (CD) player to speakers on both sides of the cabin and to individual switch panel headphone jacks. The system consists of an antenna, stereo, stereo battery, voltage regulator, audio distribution module, audio digital selectors, a remote control unit, one cabin control switch panel, and passenger switch panels located in the cabin armrests. The cabin control switch panel, located on one passenger cabin armrest (figure 7-12), incorporates lighting, cabin speaker, audio select, video select (if installed) and remote cabin temperature controls. The passenger switch panels (figure 7-13), located in the cabin armrests adjacent to the remaining passenger seats, incorporate lighting, headphone volume control, audio select controls, and a headphone jack.

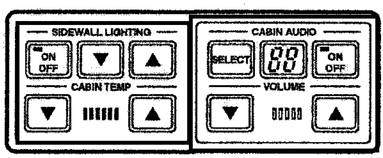
On aircraft 60-001 thru 60-103, the cabin control switch panel controls the audio output of the cabin speakers. The ON/OFF button controls the cabin speakers. The VOLUME buttons control volume to the cabin speakers as indicated by the LED display. Pressing the SELECT button selects the desired audio source (e.g., cassette, CD, etc.). The audio source is represented by a channel number (LED display) on the cabin control switch panel. In addition to the cabin control switch panel, each passenger location has a passenger control panel that may be used to select individual audio source and volume settings for use with headphones.

On aircraft 60-104 and Subsequent, the cabin control switch panel controls the audio output of the cabin speakers. The on/off function of the cabin speakers is controlled with the MUTE button. The MENU button is used to access the AUDIO, VOLUME and EQUALIZER functions. The AUDIO menu is used to select the desired audio source (e.g., CASS, CD, etc.). Once "AUDIO" is showing in the display window, the ▲ and ▼ buttons are used to scroll to the desired audio source. The VOLUME and EQUALIZER functions operate in the same manner to select the desired settings. In addition to the cabin control switch panel, each passenger location has a passenger control panel that may be used to select individual audio source, volume, bass and treble settings for use with headphones.

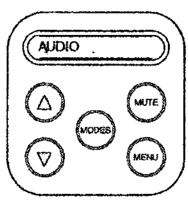
Keying the passenger address or passenger briefing system will automatically override any cabin stereo channel, including overhead speakers that have been turned off by the cabin control switch panel. Passenger address and passenger briefings are transmitted over cabin speakers and headphone jacks.

A stereo battery is located behind the stereo installation. A stereo voltage regulator will step down 28 VDC power to provide 14 VDC power to charge the stereo battery in order that preprogrammed radio channels will not be lost when aircraft power is shut down.

Power for the stereo system and voltage regulator is 28 VDC through the 7.5-amp STEREO circuit breaker on the pilot's circuit breaker panel. Power to operate the audio distribution module and audio digital selectors is 28 VDC through the 7.5-amp CABIN AUDIO circuit breaker on the copilot's circuit breaker panel. Power for the passenger speakers is 28 VDC through the 5-amp PASS SPKR circuit breaker on the copilot's circuit breaker panel.



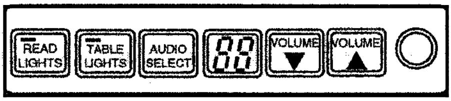
(Aircraft 60-001 thru 60-103)



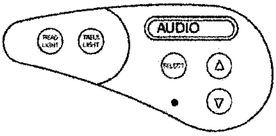
(Aircraft 60-104 and Subsequent)

CABIN CONTROL SWITCH PANEL

Figure 7-12



(Aircraft 60-001 thru 60-103)



(Aircraft 60-104 and Subsequent)
PASSENGER SWITCH PANEL
Figure 7-13

CABIN DISPLAYS

B & D Display

The B & D cabin display, which displays pre-selected flight and time information, may be installed in the forward left-hand cabinet facing aft. The display allows passengers to be informed of flight status without interrupting pilots. The unit interfaces with the aircraft avionics and can be programmed to display any combination of English or Metric measurements of altitude, true airspeed, outside air temperature, time of day, time to destination, aircraft heading, ground speed, distance to go, latitude, and longitude.

The display comes on when at least one battery switch is turned on. Operating the unit is accomplished by pressing the appropriate control buttons located on the front of the screen. Instructions appear on the display to set Cabin Display System configuration, select the data displayed, set clock/date information or self-test the display. An internal battery will maintain date and clock functions during aircraft power down.

For additional information, reference the B & D Display operator's manual. Power to the display is 28 VDC through a 2-amp CABIN DISPLAY circuit breaker on the copilot's circuit breaker panel.

Airshow 200 or 400 Video Display

An optional Airshow Video Display may be installed in either the forward right-hand cabinet facing aft, the left-hand cabinet facing aft and/or the aft right-hand partition facing forward. The display allows passengers to be informed of flight status without interrupting the pilots, in addition to other pertinent inflight information. The unit interfaces with FMS-1 and can display up to six customized modes of operation. The display receives 28 VDC power through the 3-amp CABIN DISPLAY circuit breaker on the copilot's circuit breaker panel. For additional information, reference the "Airshow 200 or 400 Operator's Manual".

To view the Airshow 200 Display:

1. Activate the TV monitor by pressing the TV PWR membrane switch in the forward, right-hand cabinet switch panel or at the cabin control switch panel.
2. Activate the Airshow 200 Display by selecting AIRSHOW with the ASHW/VCR membrane switch located on the forward right-hand cabinet or the cabin control switch panel. Then select ASHW MODE to activate Airshow 200 system.
3. Various modes of the display can be sequenced by pressing the ASHW MODE membrane switch again until the desired mode is advanced into view.

To view the Airshow 400 Display:

Using the optional hand held remote control unit, press the FWD or AFT button to activate the Airshow 400 Display.

Using the Cabin Control Switch Panel, press the MENU button until the user menu displays either FWD or AFT (FWD will activate the forward display monitor, AFT will activate the aft display monitor). Press either ▲ or ▼ keys to turn the Airshow 400 on or off.

Various modes of the Airshow 400 display can be sequenced by pressing the MODES button until the desired mode is advanced into view. The Airshow 400 has an optional Cockpit Controller which has an 8 character LED display with a push button switch (SEL) and a rocker switch. The controller can be used to enter time to destination, Greenwich Mean Time, and the destination airport identifier. For a detailed description of the Airshow system refer to the current Airshow operators manual.

AIRSHOW 400 COCKPIT CONTROLLER
Figure 7-14

CD-2000 Cabin Display System (Optional)

The CD-2000 Cabin Display System is a flat panel display, passenger address and entertainment system that displays video, moving maps, graphic displays, real time flight information, and pre-recorded briefings and messages. The system includes a Cabin Display Computer (CDC), one to four flat panel displays (FPD), an Infrared Remote Controller (IRC) (optional), Infrared Remote Detector(s) (IRD) (optional), Cockpit Control Unit (CCU) (optional), and associated aircraft wiring. The infrared remote control can work in conjunction with armrest mounted controls located in the cabin. Information for aircraft performance parameters and moving map display are provided by FMS-2.

The CCU (if installed) allows the crew to initiate stored messages and briefings as well as update estimated time of arrival. See Cabin Briefing System in Section V.

The number of graphics/info pages and video sources is dependent upon system configuration. Since the CD-2000 system can be programmed and configured for many different options only a brief description of each mode will be described here. For more complete user information, refer to the "CD-2000 Cabin Display Operating/Installation Manual".

The CD-2000 system receives 28 VDC through the 7.5-amp VIDEO circuit breaker on the pilot's circuit breaker panel and the 3.0-amp PASS INFO circuit breaker on the copilot's circuit breaker panel. An aneroid switch will disconnect power to the system if cabin altitudes exceed 9500 (± 250) feet. Power will be restored if normal cabin altitude is regained.

Many options and combinations are available so only a brief description of the modes are listed here.

Video Mode	Changes the view on the monitor from one video source to another.
Map Mode	A selection of map displays contained in CD-ROM may be selected and displayed including three different magnification maps which can be "zoomed" up or down. A Range & Bearing View is also available.
Information Mode	Both Custom and Flight Data from the aircraft's avionics and FMS-2 are used to display real-time flight information.
Window Mode	A window mode is available to the viewer for viewing of other video or graphics sources.

Keypad buttons on the display or infrared remote control are described as follows.

Display Map/Info Button	Selects graphics mode and cycles through INFO and MAP modes.
Video Select Button	Selects video; switches video sources.
Image Button	Allows adjustment of brightness, contrast and tint as appropriate. Adjustments are made using the ▲ and ▼ keys.
Window Button	Selects and deselects Window Display Mode.
▲ and ▼	During INFO mode, selects next/previous page. During MAP mode, selects, next/previous zoom level. During IMAGE mode, adjusts intensity, tint, and contrast.
Auto Button	Activates the Auto-Sequence mode.
Menu Button	Not enabled.

The remaining keys located on the lower portion of the Infrared Remote Control may be programmed to control other on-board infrared controlled devices and be labeled with appropriate legends.

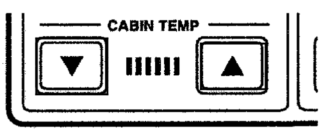
REMOTE CABIN TEMPERATURE CONTROLS

A remote cabin temperature control (figure 7-15) is located on the cabin control switch panel in the cabin armrest.

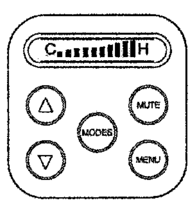
When the AUTO-CABIN-MAN switch located below the CABIN HOT-COLD selector on the copilot's switch panel is set to CABIN, control for cabin temperature is given to the cabin control switch panel.

On aircraft 60-001 thru 60-103, pressing the up or down buttons will vary the temperature between 60°F (16°C) and 90°F (32°C). The relative temperature selected by the switch is indicated by the six LED lights on the membrane panel.

On aircraft 60-104 & Subsequent, Pressing the MENU button will cause the cabin control switch panel to advance through the user menu items until temperature function is shown. The menu item consists of a bar-graph with "C" at one end and "H" at the other. There are thirty-two different settings. The select up and down buttons are used to raise and lower the setting.



(Aircraft 60-001 thru 60-103)



(Aircraft 60-104 and Subsequent)

REMOTE CABIN TEMPERATURE CONTROL PANEL
Figure 7-15

FLIGHT PHONES

Flight phones are available. One phone is located in the cockpit and the other installed in the passenger compartment. The cabin phone may be a remote phone or wired directly to the phone base. They are fully duplexed (that is, they can receive and transmit simultaneously). When not used as a telephone, they can serve as an intercom system between the cabin and cockpit. Different models may be selected and their use and functionality are found in the appropriate operator's guide.

Flight phones are designed for airborne telephone service and can be operated from the cockpit or the cabin using the appropriate control units. The flight phones operate in the Air/Ground Radiotelephone Automated Service (AGRAS) system. The flight phones may receive calls from the ground when they are placed to the AGRAS Credit Card Number or the QM number. The AGRAS Credit Card Number is installed by the user from the control units while the QM number is shop installed. When properly coded into the flight phone, AGRAS provides for the direct-dial call placement completely analogous to the business office phone. The AGRAS system or QM number does not apply to the Iridium SATCOM system.

Power to the flight phones is 28 VDC through the FLITE FONE circuit breaker on the pilot's circuit breaker panel. The amperage of the circuit breaker varies with model and equipment: 7.5-amp for UHF Flitefone VI with FAX, 5.0-amp for UHF Flitefone VI without voice privacy or FAX, 5.0-amp for Jetfone with or without FAX, 10.0-amp for Flitefone 800 with or without FAX or 10.0 amp for the Magnastar C-2000 Digital Airborne Telephone System with or without FAX.

IRIDIUM SATCOM SYSTEM (OPTIONAL)

The Iridium SATCOM system consists of single or dual channel transceiver, wired or wireless handsets, and low profile top mounted SATCOM antenna. The device provides features such as air to air, air to ground, ground to air call transfer, extension to extension calling, and three party conferencing. The system uses the Iridium Low Earth Orbit (LEO) satellite constellation for global voice and data communications services including the polar regions. A customer selected service provider is identified on the Subscriber Identity Module (SIM) card installed in the transceiver. Power to the Iridium SATCOM system is through a 5 amp circuit breaker on the pilot's circuit breaker panel. Refer to user's manual for more detailed instructions on the use of the Iridium SATCOM system.

FAX MODEM ADAPTER

An optional FAX modem adapter may be installed in the cabin. The FAX modem is used in conjunction with the flight phone system to receive or transmit FAXs. Power to the FAX adapter is 28 VDC through the FLITE FONE circuit breaker on the pilot's circuit breaker panel.

RAZOR OUTLET

A razor outlet is located in the lavatory above the sink. The outlet incorporates a ground fault interrupt (GFI) circuit which, if tripped, may be reset. To gain access to the GFI circuit, first remove the center cover panel to the outlet. (It may be easier to remove the center panel by removing the panel to the tissue and trash covers first). Use caution when removing the center cover panel since wiring is attached to the outlet. Another outlet with the GFI circuit is located to the bottom of the compartment. Press the TEST/RESET button to reset the outlet. The outlet receives 115 VAC through a 2-amp RAZOR circuit breaker on the copilot's circuit breaker panel. An optional razor outlet power supply may be installed that provides 230 VAC. An aneroid switch will disconnect power to the outlet if the cabin altitude should reach 9500 (± 250) feet. Power will be restored if normal cabin altitude is regained.

AC OUTLET

An optional 115 VAC outlet may be located near the floor in the forward right-hand closet or along the outboard floor near the forward, right-hand seat. It receives 115 VAC through a 15-amp AC OUTLETS circuit breaker on the copilot's circuit breaker panel. An aneroid switch will disconnect power to the outlet if the cabin altitude should reach 9500 (±250) feet. Power will be restored if normal cabin altitude is regained.

WINDOW SHADES

Window shades are installed in all passenger compartment windows. The shades can be lowered or raised to any level. The shades are translucent and will not totally block out light.

GASPER OUTLETS

Individual gasper, or air outlets, are available in the cockpit and in the cabin convenience panels. These outlets may be turned to approximately 40° around its center to direct air flow as desired. Rotate the conical port counterclockwise to open and clockwise to close.

SKI STORAGE BOX

The ski storage box is installed between the seats, and it's used for storing ski's and other objects weighing less than 50lbs. The box is constructed of hardwood and metal, and consist of two parts, forward and aft, carpeted on the top, front, and back. The box is secured to the floor, and the door must be closed and latched during takeoff and landing.

CABIN BAGGAGE COMPARTMENT

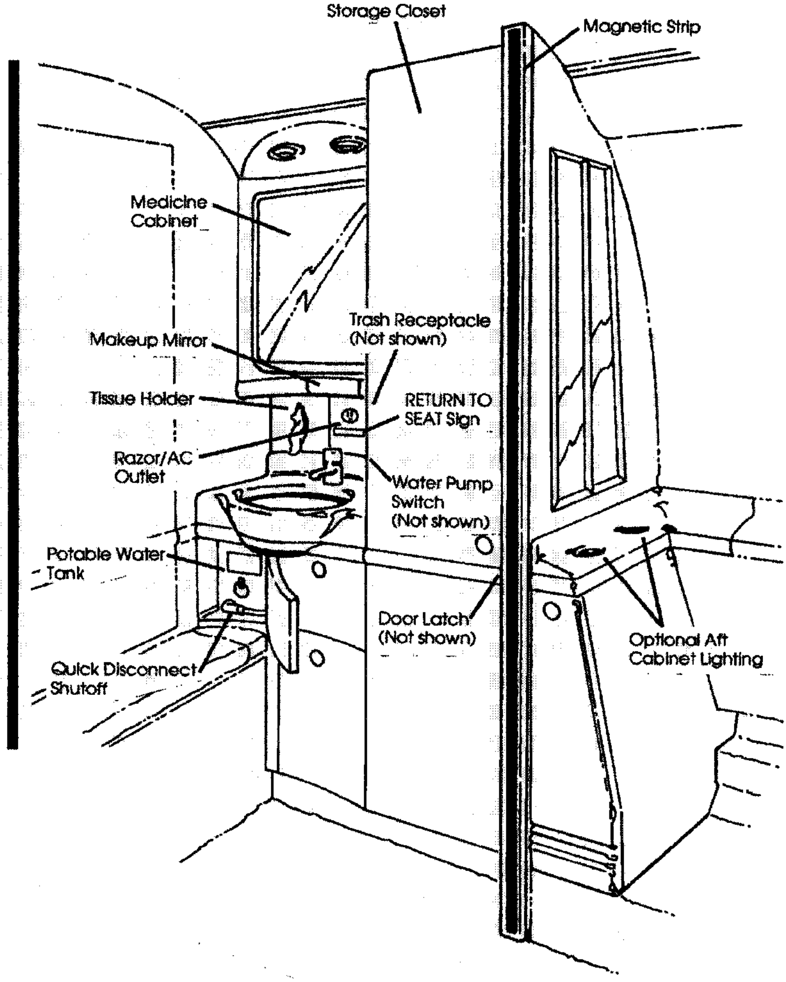
The door to the aft cabin baggage compartment is located in the lavatory. On some interior configurations, it is a bi-fold door with a recessed, pull-type latch to open and close. When the door is closed and the latch pushed fully in, bolts in the door will engage into the top, bottom, and outboard side of the door jamb thus securing the door. On other interior configurations, the door is a tambour type. The door opens and closes by sliding in an upper and lower track. When fully open, the door is hidden in the partition. When fully closed, the latch will keep the door secured. The maximum weight for the cabin baggage compartment is placarded. The cabin baggage compartment may also be accessed through the emergency exit/baggage door.

LAVATORY/VANITY

The lavatory/vanity (figure 7-16) is equipped with a sink, toilet, potable water tank, water pump, water heater, faucet and valves, interconnecting plumbing, tissue holder, AC outlet, trash container, lighted vanity, make-up mirror, medicine cabinet, storage closet and drawers.

The lavatory is separated from the passenger cabin with a sliding door that is stowed and latched on the left-side of the bulkhead. The door is latched open with a recessed latch on the aft-side of the door to a catch in the aft-side of the bulkhead wall. A magnetic strip along the door edge allows the door to be closed but cannot be locked shut.

The potable water tank, pump, and heater are located under the sink. The tank itself is in the lavatory aft cabinet below the sink and holds approximately 1.5 gallons (5.7 liters). It is equipped with a quick disconnect shutoff for easy removal and installation. To remove the potable water tank, press the disconnect lever on the plumbing connection and pull it apart from the tubing. Pull the tank straight out from the cabinet. It is recommended that the potable water tank be removed from the aircraft during extended cold weather to prevent the water in the tank from freezing and damaging the tank. For more information on the servicing of the potable water tank, reference the GROUND HANDLING, SERVICING AND EMERGENCY INFORMATION manual.



LAVATORY/VANITY (TYPICAL)
Figure 7-16

The heater is part of the potable water tank and disconnects electrically when the tank is removed from the cabinet. On some aircraft, the heater turns on automatically when DC power is applied to the airplane and the potable water tank is plugged into its power source. It automatically increases water temperature to 100°F (38°C). On other aircraft, the heater is controlled by an ON/OFF switch located next to the AC outlet on the lavatory wall. A 1-amp WATER HTR FAULT circuit breaker is installed in the cabinet below the sink.

The water heater receives 28 VDC through the 7.5-amp or 10-amp WATER HEATER circuit breaker on the pilot's circuit breaker panel. The water pump receives 28 VDC power through the 7.5-amp LAV LTS circuit breaker on the pilot's circuit breaker panel. The lavatory lights do not need to be on to operate the water pump.

The water pump on some aircraft must be turned on before water will come from the faucet. The switch for the water pump is to the right of the faucet on the lavatory wall. On other aircraft, the water faucet is an on-demand type pump and will supply water when the faucet handle is placed in the on position. Only warm water from the potable water tank is available from the faucet. The water pump should be turned off when not in use. On some aircraft, the pump is protected by a 3-amp WATER PUMP circuit breaker installed in the cabinet below the sink.

A medicine cabinet is located behind the lavatory mirror. A make-up mirror is located directly below the lavatory mirror. It is accessed by pulling straight out from the underside of the center frame just above the razor outlet. The makeup mirror can then be swiveled up and down on a hinge to adjust to any desired angle.

The sink drain on some aircraft is mechanically operated. Lifting the drain handle will drain the water from the sink. On other aircraft, the sink is drained by pressing the DRAIN switch located in the vanity. A green LED on the switch will illuminate when the switch is pressed. The LED will extinguish when the switch is released. The water is drained through a heated drain mast on the bottom of the aircraft. The heater is activated through a squat switch and prevents ice from forming on the drain mast. The drain mast heater receives 28 VDC through the 5-amp TOILET circuit breaker on the pilot's circuit breaker panel.

A lavatory closet includes a coat rod, pull down shelf for brief cases, and automatic lighting activated through a microswitch in the door. The lavatory trash container can be accessed through the access panel inside the lavatory closet. To empty the trash, open the closet panel, grab the available "D" ring on the side of the container, and slide the metal container straight out. When replacing the container, the "D" ring must be flush against the container in order to close the access panel.

Toilet

A flushing toilet is installed in the lavatory. This unit features a two-compartment design isolating the flushing fluid from the waste. Raising the lid opens the sealed valve at the bottom of the bowl. Closing the lid automatically flushes the toilet. Length of the flush cycle is controlled automatically. Two electric pumps are used in this unit. The flushing pump circulates the flushing fluid during the flush cycle. The macerator/pump unloads the waste from the toilet during servicing only.

CAUTION

Use only biodegradable toilet paper such as that used in recreational vehicles. Do not use the toilet to dispose of other paper products, cigarettes, sanitary napkins, coffee grounds, etc. The macerator/pump will become clogged with these items making external servicing of the toilet impossible.

Servicing of the toilet is accomplished using servicing ports located on the aircraft exterior. The macerator/pump is used to pump the waste from the toilet while fresh flushing fluid is pumped into the toilet from the servicing equipment. Refer to Chapter 12 in the maintenance manual for servicing instructions.

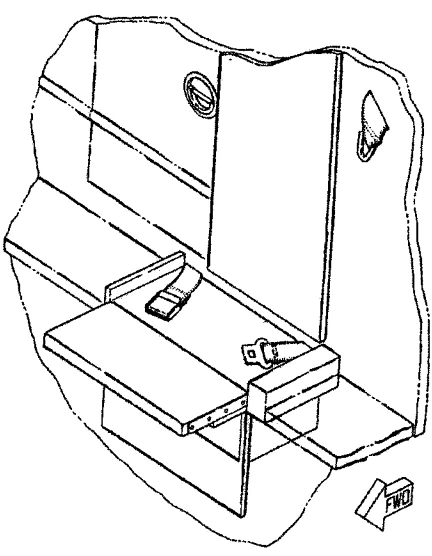
Power to operate the flushing circuit is 28 VDC supplied through the 5-amp TOILET circuit breaker on the pilot's circuit breaker panel. Power to operate the servicing circuit is 28 VDC supplied through the 10-amp TOILET SERVICE circuit breaker on the pilot's circuit breaker panel. The TOILET SERVICE circuit breaker is powered from the left battery bus; therefore, servicing can be accomplished without turning the battery switches on.

AFT JUMP SEAT

An optional jump seat (figure 7-17) may be installed in the aft lavatory area. The jump seat is accessed by unfolding the seat cushion out from the top of the storage box adjacent to the aft baggage bulkhead. Three-point combined seat belts with a single-point release are used for the jump seat and are located on top of the storage box.

To use the three-point seat belt, bring the seat belt around the hips first, latch and tighten by pulling the webbing on the right side of the latch assembly. The shoulder harness is located above the passengers left shoulder. Grab the shoulder harness and pull across the body and attach to the opposite side of the lap belt. To unfasten the belts, first remove and stow the shoulder harness. The shoulder harness is stowed by gently pulling to activate the reel that rolls it into the bulkhead. Use caution not to pull the shoulder harness too aggressively causing the belt to quickly fly into its reel, thus possibly damaging any surrounding wall covering. The seat belt is released by lifting up on the belt assembly. The jump seat may be stowed by folding it back onto the storage compartment.

The life vest for the jump seat is stowed under the seat and is accessed by opening the front panel. Due to emergency exit access assistance and requirements the jump seat is certified for adults only.



AFT JUMP SEAT INSTALLATION
Figure 7-17

SECTION VIII
FLIGHT CHARACTERISTICS & OPERATIONAL PLANNING

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TABLE OF CONTENTS (CONT)

SECTION VIII
FLIGHT CHARACTERISTICS & OPERATIONAL PLANNING

GENERAL FLIGHT CHARACTERISTICS

Taxi operations can be conducted using one or both engines. If nose-wheel steering is inoperative or when taxiing on a slick or icy surface, it is recommended that taxiing be conducted using both engines to preclude aggravating the problem with asymmetric thrust.

The digital nose-wheel steering system provides excellent taxi maneuverability. At low ground speeds, nose wheel travel is approximately 60° either side of neutral. The steering authority tapers off as ground speed increases and is reduced to zero at approximately 80 knots. At 90 knots, the system will automatically disengage. The rudder is effective for directional control above 45 KIAS.

The two pod-mounted PW305A engines, manufactured by Pratt and Whitney Canada, Inc., are rated at 4600 pounds thrust at sea level. The time required to accelerate these engines from idle RPM to maximum thrust RPM is approximately seven (7) seconds. The engine thrust and acceleration characteristics complement the Learjet 60 airframe so that outstanding performance, flexibility, and safety margins are available in all flight regimes. Single-engine performance offers an example of these capabilities in that the sea-level single-engine rate of climb at 23,100 pounds is approximately 1,340 feet per minute and the single-engine service ceiling is approximately 31,000 feet at a cruise weight of 19,000 pounds.

GENERAL FLIGHT CHARACTERISTICS (CONT)

Although the flight control systems are manual, stick forces are light to moderate throughout the flight envelope. Stability is good at all airspeeds and airplane configurations. Aircraft responsiveness and flight control authority are very good throughout the flight envelope. A yaw damper is employed to damp lateral oscillations caused by turbulent air; however, it is not required for dispatch. Trim changes due to use of the landing gear, flaps and power are slight; however, a trim change is required when spoilers are extended or retracted.

The dual stall warning system provides an excellent indication of impending airplane stall. Additionally, the airplane exhibits an aerodynamic stall warning buffet in all configurations. The shaker actuates at least 7% above the stall speed published in the Airplane Flight Manual. The shaker system produces a high-frequency, low-amplitude vibration transmitted to the control columns. As the shakers actuate, the red low-speed awareness cue reaches the center of the airspeed display on the EFIS, the angle-of-attack indicator needle enters the yellow arc and the stall warning lights illuminate and flash. Recovery is easily accomplished by lowering the nose of the airplane while simultaneously advancing power as necessary to accelerate out of the stall regime. Good aircraft response, to elevator inputs, occurs throughout the aircraft operating envelope.

The spoiler system provides an effective means of increasing normal rates of descent and may be used as a drag device to achieve rapid airspeed deceleration. The spoilers are used just after touchdown to spoil the lift for more effective braking action and to increase drag for minimum landing roll. Aileron augmentation is accomplished by the spoiler system when the SPOILER switch is in the RET or ARM position and the flaps are lowered beyond 25°.

OPERATIONAL PLANNING

The charts and tables on the following pages contain performance data for climb, cruise, descent and holding. Takeoff and landing performance data is presented in tabular form in the FAA Approved Flight Manual. Fuel consumption information is presented based on flight test data and average engine characteristics. The following conditions are to be assumed when extracting data from this section:

WEIGHT	All weights presented in this section are to be understood as the gross weight of the airplane in pounds. For flight planning, the climb weight used is the gross weight of the airplane at the start of climb, the cruise weight used is the mid-weight between the start cruise weight and the end cruise weight and the descent weight used is assumed to be 16,000 pounds.
ALTITUDE	All altitudes presented in this section are to be understood as pressure altitude in feet.
TEMPERATURE	OAT — Outside Air Temperature. For presentation in this section, Temperature is to be understood as OAT unless otherwise specified.
	SAT — Static Air Temperature obtained from inflight indications. SAT is equivalent to OAT.
	RAT — Ram Air Temperature obtained from inflight measurement (includes compression rise).

OPERATIONAL PLANNING (CONT)

FUEL FLOW

The fuel flows presented are for two engines except where single-engine performance is specified.

FLAPS

The wing flap position for various flight conditions is as follows:

Climb .... UP-0°
Enroute .... UP-0°
Holding .... UP-0°

OPERATIONAL PLANNING FORM

	WEIGHT	TIME	DISTANCE	FUEL
ZERO FUEL WEIGHT				
FUEL LOAD				
RAMP WEIGHT				
WARMUP & TAKEOFF				
ALTITUDE =				
START CLIMB WEIGHT				
CLIMB				
END CLIMB WEIGHT				
Altitude =				
START CRUISE WEIGHT				
CRUISE				
END CRUISE WEIGHT				
Altitude =				
START CLIMB WEIGHT				
CLIMB				
END CLIMB WEIGHT				
Altitude =				
START CRUISE WEIGHT				
CRUISE				
END CRUISE WEIGHT				
Altitude =				
START CLIMB WEIGHT				
CLIMB				
END CLIMB WEIGHT				
Altitude =				
START CRUISE WEIGHT				
CRUISE				
END CRUISE WEIGHT				
Altitude =				
START DESCENT WEIGHT				
DESCENT				
END DESCENT WEIGHT				
Altitude =				
RESERVES				
ZERO FUEL WEIGHT				
	TOTALS			

NOTES: ____________________

Figure 8-1

TEMPERATURE CONVERSION

- To convert from Celsius to Fahrenheit, find, in the bold face columns, the number representing the Celsius temperature to be converted. The equivalent Fahrenheit temperature is read in the adjacent column headed °F.
- To convert from Fahrenheit to Celsius, find, in the bold face columns, the number representing the Fahrenheit temperature to be converted. The equivalent Celsius temperature is read in the adjacent column headed °C.

°F		°C	°F		°C	°F		°C	°F		°C	°F		°C
-148.0	**-100**	-73.3	-58.0	**-50**	-45.6	32.0	**0**	-17.8	122.0	**50**	10.0	212.0	**100**	37.8
-146.2	**-99**	-72.8	-56.2	**-49**	-45.0	33.8	**1**	-17.2	123.8	**51**	10.6	213.8	**101**	38.3
-144.4	**-98**	-72.2	-54.4	**-48**	-44.4	35.6	**2**	-16.7	125.6	**52**	11.1	215.6	**102**	38.9
-142.6	**-97**	-71.7	-52.6	**-47**	-43.9	37.4	**3**	-16.1	127.4	**53**	11.7	217.4	**103**	39.4
-140.8	**-96**	-71.1	-50.8	**-46**	-43.3	39.2	**4**	-15.6	129.2	**54**	12.2	219.2	**104**	40.0
-139.0	**-95**	-70.6	-49.0	**-45**	-42.8	41.0	**5**	-15.0	131.0	**55**	12.8	221.0	**105**	40.6
-137.2	**-94**	-70.0	-47.2	**-44**	-42.2	42.8	**6**	-14.4	132.8	**56**	13.3	222.8	**106**	41.1
-135.4	**-93**	-69.4	-45.4	**-43**	-41.7	44.6	**7**	-13.9	134.6	**57**	13.9	224.6	**107**	41.7
-133.6	**-92**	-68.9	-43.6	**-42**	-41.1	46.4	**8**	-13.3	136.4	**58**	14.4	226.4	**108**	42.2
-131.8	**-91**	-68.3	-41.8	**-41**	-40.6	48.2	**9**	-12.8	138.2	**59**	15.0	228.2	**109**	42.8
-130.0	**-90**	-67.8	-40.0	**-40**	-40.0	50.0	**10**	-12.2	140.0	**60**	15.6	230.0	**110**	43.3
-128.2	**-89**	-67.2	-38.2	**-39**	-39.4	51.8	**11**	-11.7	141.8	**61**	16.1	231.8	**111**	43.9
-126.4	**-88**	-66.7	-36.4	**-38**	-38.9	53.6	**12**	-11.1	143.6	**62**	16.7	233.6	**112**	44.4
-124.6	**-87**	-66.1	-34.6	**-37**	-38.3	55.4	**13**	-10.6	145.4	**63**	17.2	235.4	**113**	45.0
-122.8	**-86**	-65.6	-32.8	**-36**	-37.8	57.2	**14**	-10.0	147.2	**64**	17.8	237.2	**114**	45.6
-121.0	**-85**	-65.0	-31.0	**-35**	-37.2	59.0	**15**	-9.4	149.0	**65**	18.3	239.0	**115**	46.1
-119.2	**-84**	-64.4	-29.2	**-34**	-36.7	60.8	**16**	-8.9	150.8	**66**	18.9	240.8	**116**	46.7
-117.4	**-83**	-63.9	-27.4	**-33**	-36.1	62.6	**17**	-8.3	152.6	**67**	19.4	242.6	**117**	47.2
-115.6	**-82**	-63.3	-25.6	**-32**	-35.6	64.4	**18**	-7.8	154.4	**68**	20.0	244.4	**118**	47.8
-113.8	**-81**	-62.8	-23.8	**-31**	-35.0	66.2	**19**	-7.2	156.2	**69**	20.6	246.2	**119**	48.3
-112.0	**-80**	-62.2	-22.0	**-30**	-34.4	68.0	**20**	-6.7	158.0	**70**	21.1	248.0	**120**	48.9
-110.2	**-79**	-61.7	-20.2	**-29**	-33.9	69.8	**21**	-6.1	159.8	**71**	21.7	249.8	**121**	49.4
-108.4	**-78**	-61.1	-18.4	**-28**	-33.3	71.6	**22**	-5.6	161.6	**72**	22.2	251.6	**122**	50.0
-106.6	**-77**	-60.6	-16.6	**-27**	-32.8	73.4	**23**	-5.0	163.4	**73**	22.8	253.4	**123**	50.6
-104.8	**-76**	-60.0	-14.8	**-26**	-32.2	75.2	**24**	-4.4	165.2	**74**	23.3	255.2	**124**	51.1
-103.0	**-75**	-59.4	-13.0	**-25**	-31.7	77.0	**25**	-3.9	167.0	**75**	23.9	257.0	**125**	51.7
-101.2	**-74**	-58.9	-11.2	**-24**	-31.1	78.8	**26**	-3.3	168.8	**76**	24.4	258.8	**126**	52.2
-99.4	**-73**	-58.3	-9.4	**-23**	-30.6	80.6	**27**	-2.8	170.6	**77**	25.0	260.6	**127**	52.8
-97.6	**-72**	-57.8	-7.6	**-22**	-30.0	82.4	**28**	-2.2	172.4	**78**	25.6	262.4	**128**	53.3
-95.8	**-71**	-57.2	-5.8	**-21**	-29.4	84.2	**29**	-1.7	174.2	**79**	26.1	264.2	**129**	53.9
-94.0	**-70**	-56.7	-4.0	**-20**	-28.9	86.0	**30**	-1.1	176.0	**80**	26.7	266.0	**130**	54.4
-92.2	**-69**	-56.1	-2.2	**-19**	-28.3	87.8	**31**	-0.6	177.8	**81**	27.2	267.8	**131**	55.0
-90.4	**-68**	-55.6	-0.4	**-18**	-27.8	89.6	**32**	0.0	179.6	**82**	27.8	269.6	**132**	55.6
-88.6	**-67**	-55.0	1.4	**-17**	-27.2	91.4	**33**	0.6	181.4	**83**	28.3	271.4	**133**	56.1
-86.8	**-66**	-54.4	3.2	**-16**	-26.7	93.2	**34**	1.1	183.2	**84**	28.9	273.2	**134**	56.7
-85.0	**-65**	-53.9	5.0	**-15**	-26.1	95.0	**35**	1.7	185.0	**85**	29.4	275.0	**135**	57.2
-83.2	**-64**	-53.3	6.8	**-14**	-25.6	96.8	**36**	2.2	186.8	**86**	30.0	276.8	**136**	57.8
-81.4	**-63**	-52.8	8.6	**-13**	-25.0	98.6	**37**	2.8	188.6	**87**	30.6	278.6	**137**	58.3
-79.6	**-62**	-52.2	10.4	**-12**	-24.4	100.4	**38**	3.3	190.4	**88**	31.1	280.4	**138**	58.9
-77.8	**-61**	-51.7	12.2	**-11**	-23.9	102.2	**39**	3.9	192.2	**89**	31.7	282.2	**139**	59.4
-76.0	**-60**	-51.1	14.0	**-10**	-23.3	104.0	**40**	4.4	194.0	**90**	32.2	284.0	**140**	60.0
-74.2	**-59**	-50.6	15.8	**-9**	-22.8	105.8	**41**	5.0	195.8	**91**	32.8	285.8	**141**	60.6
-72.4	**-58**	-50.0	17.6	**-8**	-22.2	107.6	**42**	5.6	197.6	**92**	33.3	287.6	**142**	61.1
-70.6	**-57**	-49.4	19.4	**-7**	-21.7	109.4	**43**	6.1	199.4	**93**	33.9	289.4	**143**	61.7
-68.8	**-56**	-48.9	21.2	**-6**	-21.1	111.2	**44**	6.7	201.2	**94**	34.4	291.2	**144**	62.2
-67.0	**-55**	-48.3	23.0	**-5**	-20.6	113.0	**45**	7.2	203.0	**95**	35.0	293.0	**145**	62.8
-65.2	**-54**	-47.8	24.8	**-4**	-20.0	114.8	**46**	7.8	204.8	**96**	35.6	294.8	**146**	63.3
-63.4	**-53**	-47.2	26.6	**-3**	-19.4	116.6	**47**	8.3	206.6	**97**	36.1	296.6	**147**	63.9
-61.6	**-52**	-46.7	28.4	**-2**	-18.9	118.4	**48**	8.9	208.4	**98**	36.7	298.4	**148**	64.4
-59.8	**-51**	-46.1	30.2	**-1**	-18.3	120.2	**49**	9.4	210.2	**99**	37.2	300.2	**149**	65.0

Figure 8-2

LINEAR CONVERSIONS

- To convert from meters to feet, find, in the bold face columns, the number of meters to be converted. The equivalent number of feet is read in the adjacent column headed FEET.
- To convert from feet to meters, find, in the bold face columns, the number of feet to be converted. The equivalent number of meters is read in the adjacent column headed METERS.

METERS	◄►	FEET	METERS	◄►	FEET	METERS	◄►	FEET
304.8	**1000**	3280.8	1341.1	**4400**	14435.5	2377.5	**7800**	25590.2
335.3	**1100**	3608.9	1371.6	**4500**	14763.6	2407.9	**7900**	25918.3
365.8	**1200**	3937.0	1402.1	**4600**	15091.7	2438.4	**8000**	26246.4
396.2	**1300**	4265.0	1432.6	**4700**	15419.8	2468.9	**8100**	26574.5
426.7	**1400**	4593.1	1463.1	**4800**	15747.8	2499.4	**8200**	26902.6
457.2	**1500**	4921.2	1493.5	**4900**	16075.9	2529.9	**8300**	27230.6
487.7	**1600**	5249.3	1524.0	**5000**	16404.0	2560.4	**8400**	27558.7
518.2	**1700**	5577.4	1554.5	**5100**	16732.1	2590.8	**8500**	27886.8
548.6	**1800**	5905.4	1585.0	**5200**	17060.2	2621.3	**8600**	28214.9
579.1	**1900**	6233.5	1615.5	**5300**	17388.2	2651.8	**8700**	28543.0
609.6	**2000**	6561.6	1645.9	**5400**	17716.3	2682.3	**8800**	28871.0
640.1	**2100**	6889.7	1676.4	**5500**	18044.4	2712.8	**8900**	29199.1
670.6	**2200**	7217.8	1706.9	**5600**	18372.5	2743.2	**9000**	29527.2
701.0	**2300**	7545.8	1737.4	**5700**	18700.6	2773.7	**9100**	29855.3
731.5	**2400**	7873.9	1767.9	**5800**	19028.6	2804.2	**9200**	30183.4
762.0	**2500**	8202.0	1798.3	**5900**	19356.7	2834.7	**9300**	30511.4
792.5	**2600**	8530.1	1828.8	**6000**	19684.8	2865.2	**9400**	30839.5
823.0	**2700**	8858.2	1859.3	**6100**	20012.9	2895.6	**9500**	31167.6
853.5	**2800**	9186.2	1889.8	**6200**	20341.0	2926.1	**9600**	31495.7
883.9	**2900**	9514.3	1920.3	**6300**	20669.0	2956.6	**9700**	31823.8
914.4	**3000**	9842.4	1950.7	**6400**	20997.1	2987.1	**9800**	32151.8
944.9	**3100**	10170.5	1981.2	**6500**	21325.2	3017.6	**9900**	32479.9
975.4	**3200**	10498.6	2011.7	**6600**	21653.3	3048.0	**10000**	32808.0
1005.9	**3300**	10826.6	2042.2	**6700**	21981.4	3352.8	**11000**	36088.8
1036.3	**3400**	11154.7	2072.7	**6800**	22309.4	3657.6	**12000**	39369.6
1066.8	**3500**	11482.8	2103.1	**6900**	22637.5	3962.4	**13000**	42650.4
1097.3	**3600**	11810.9	2133.6	**7000**	22965.6	4267.3	**14000**	45931.2
1127.8	**3700**	12139.0	2164.1	**7100**	23293.7	4572.1	**15000**	49212.0
1158.3	**3800**	12467.0	2194.6	**7200**	23621.8	4876.9	**16000**	52492.8
1188.7	**3900**	12795.1	2225.1	**7300**	23949.8	5181.7	**17000**	55773.6
1219.2	**4000**	13123.2	2255.5	**7400**	24277.9	5486.5	**18000**	59054.4
1249.7	**4100**	13451.3	2286.0	**7500**	24606.0	5791.3	**19000**	62335.2
1280.2	**4200**	13779.4	2316.5	**7600**	24934.1	6096.1	**20000**	65616.0
1310.7	**4300**	14107.4	2347.0	**7700**	25262.2	6400.9	**21000**	68896.8

Figure 8-3

VOLUME CONVERSIONS

- To convert from liters to gallons, find, in the bold face columns, the number of liters to be converted. The equivalent number of gallons is read in the adjacent column headed GALLONS.
- To convert from gallons to liters, find, in the bold face columns, the number of gallons to be converted. The equivalent number of liters is read in the adjacent column headed LITERS.

LITERS	◄►	GALLONS	LITERS	◄►	GALLONS	LITERS	◄►	GALLONS
18.9	**5**	1.3	1476.2	**390**	103.0	2952.3	**780**	206.1
37.9	**10**	2.6	1514.0	**400**	105.7	2990.2	**790**	208.7
75.7	**20**	5.3	1551.9	**410**	108.3	3028.0	**800**	211.4
113.6	**30**	7.9	1589.7	**420**	111.0	3065.9	**810**	214.0
151.4	**40**	10.6	1627.6	**430**	113.6	3103.7	**820**	216.6
189.3	**50**	13.2	1665.4	**440**	116.2	3141.6	**830**	219.3
227.1	**60**	15.9	1703.3	**450**	118.9	3179.4	**840**	221.9
265.0	**70**	18.5	1741.1	**460**	121.5	3217.3	**850**	224.6
302.8	**80**	21.1	1779.0	**470**	124.2	3255.1	**860**	227.2
340.7	**90**	23.8	1816.8	**480**	126.8	3293.0	**870**	229.9
378.5	**100**	26.4	1854.7	**490**	129.5	3330.8	**880**	232.5
416.4	**110**	29.1	1892.5	**500**	132.1	3368.7	**890**	235.1
454.2	**120**	31.7	1930.4	**510**	134.7	3406.5	**900**	237.8
492.1	**130**	34.3	1968.2	**520**	137.4	3444.4	**910**	240.4
529.9	**140**	37.0	2006.1	**530**	140.0	3482.2	**920**	243.1
567.8	**150**	39.6	2043.9	**540**	142.7	3520.1	**930**	245.7
605.6	**160**	42.3	2081.8	**550**	145.3	3557.9	**940**	248.3
643.5	**170**	44.9	2119.6	**560**	148.0	3595.8	**950**	251.0
681.3	**180**	47.6	2157.5	**570**	150.6	3633.6	**960**	253.6
719.2	**190**	50.2	2195.3	**580**	153.2	3671.5	**970**	256.3
757.0	**200**	52.8	2233.2	**590**	155.9	3709.3	**980**	258.9
794.9	**210**	55.5	2271.0	**600**	158.5	3747.2	**990**	261.6
832.7	**220**	58.1	2308.9	**610**	161.2	3785.0	**1000**	264.2
870.6	**230**	60.8	2346.7	**620**	163.8	4163.5	**1100**	290.6
908.4	**240**	63.4	2384.6	**630**	166.4	4542.0	**1200**	317.0
946.3	**250**	66.0	2422.4	**640**	169.1	4920.5	**1300**	343.5
984.1	**260**	68.7	2460.3	**650**	171.7	5299.0	**1400**	369.9
1022.0	**270**	71.3	2498.1	**660**	174.4	5677.5	**1500**	396.3
1059.8	**280**	74.0	2536.0	**670**	177.0	6056.0	**1600**	422.7
1097.7	**290**	76.6	2573.8	**680**	179.7	6434.5	**1700**	449.1
1135.5	**300**	79.3	2611.7	**690**	182.3	6813.0	**1800**	475.6
1173.4	**310**	81.9	2649.5	**700**	184.9	7191.5	**1900**	502.0
1211.2	**320**	84.5	2687.4	**710**	187.6	7570.0	**2000**	528.4
1249.1	**330**	87.2	2725.2	**720**	190.2	7948.5	**2100**	554.8
1286.9	**340**	89.8	2763.1	**730**	192.9	8327.0	**2200**	581.2
1324.8	**350**	92.5	2800.9	**740**	195.5	8705.5	**2300**	607.7
1362.6	**360**	95.1	2838.8	**750**	198.1	9084.0	**2400**	634.1
1400.5	**370**	97.8	2876.6	**760**	200.8	9462.5	**2500**	660.5
1438.3	**380**	100.4	2914.5	**770**	203.4	9841.0	**2600**	686.9

Figure 8-4

WEIGHT CONVERSIONS

- To convert from kilograms to pounds, find, in the bold face columns, the number of kilograms to be converted. The equivalent number of pounds is read in the adjacent column headed POUNDS.
- To convert from pounds to kilograms, find, in the bold face columns, the number of pounds to be converted. The equivalent number of kilograms is read in the adjacent column headed KILOGRAMS.

KILOGRAMS	◀▶	POUNDS	KILOGRAMS	◀▶	POUNDS	KILOGRAMS	◀▶	POUNDS
4.5	**10**	22.0	208.7	**460**	1014.1	412.8	**910**	2006.2
9.1	**20**	44.1	213.2	**470**	1036.2	417.3	**920**	2028.2
13.6	**30**	66.1	217.7	**480**	1058.2	421.8	**930**	2050.3
18.1	**40**	88.2	222.3	**490**	1080.3	426.4	**940**	2072.3
22.7	**50**	110.2	226.8	**500**	1102.3	430.9	**950**	2094.4
27.2	**60**	132.3	231.3	**510**	1124.3	435.5	**960**	2116.4
31.8	**70**	154.3	235.9	**520**	1146.4	440.0	**970**	2138.5
36.3	**80**	176.4	240.4	**530**	1168.4	444.5	**980**	2160.5
40.8	**90**	198.4	244.9	**540**	1190.5	449.1	**990**	2182.6
45.4	**100**	220.5	249.5	**550**	1212.5	453.6	**1000**	2204.6
49.9	**110**	242.5	254.0	**560**	1234.6	499.0	**1100**	2425.1
54.4	**120**	264.6	258.6	**570**	1256.6	544.3	**1200**	2645.5
59.0	**130**	286.6	263.1	**580**	1278.7	589.7	**1300**	2866.0
63.5	**140**	308.6	267.6	**590**	1300.7	635.0	**1400**	3086.4
68.0	**150**	330.7	272.2	**600**	1322.8	680.4	**1500**	3306.9
72.6	**160**	352.7	276.7	**610**	1344.8	907.2	**2000**	4409.2
77.1	**170**	374.8	281.2	**620**	1366.9	1134.0	**2500**	5511.5
81.6	**180**	396.8	285.8	**630**	1388.9	1360.8	**3000**	6613.8
86.2	**190**	418.9	290.3	**640**	1410.9	1587.6	**3500**	7716.1
90.7	**200**	440.9	294.8	**650**	1433.0	1814.4	**4000**	8818.4
95.3	**210**	463.0	299.4	**660**	1455.0	2041.2	**4500**	9920.7
99.8	**220**	485.0	303.9	**670**	1477.1	2268.0	**5000**	11023.0
104.3	**230**	507.1	308.4	680	1499.1	2494.8	**5500**	12125.3
108.9	**240**	529.1	313.0	**690**	1521.2	2721.6	**6000**	13227.6
113.4	**250**	551.1	317.5	**700**	1543.2	2948.4	**6500**	14329.9
117.9	**260**	573.2	322.1	**710**	1565.3	3175.2	**7000**	15432.2
122.5	**270**	595.2	326.6	**720**	1587.3	3402.0	**7500**	16534.5
127.0	**280**	617.3	331.1	**730**	1609.4	3628.8	**8000**	17636.8
131.5	**290**	639.3	335.7	**740**	1631.4	3855.6	**8500**	18739.1
136.1	**300**	661.4	340.2	**750**	1653.4	4082.4	**9000**	19841.4
140.6	**310**	683.4	344.7	**760**	1675.5	4309.2	**9500**	20943.7
145.2	**320**	705.5	349.3	**770**	1697.5	4536.0	**10000**	22046.0
149.7	**330**	727.5	353.8	**780**	1719.6	4989.6	**11000**	24250.6
154.2	**340**	749.6	358.3	**790**	1741.6	5443.2	**12000**	26455.2
158.8	**350**	771.6	362.9	**800**	1763.7	5896.8	**13000**	28659.8
163.3	**360**	793.7	367.4	**810**	1785.7	6350.4	**14000**	30864.4
167.8	**370**	815.7	371.9	**820**	1807.8	6804.0	**15000**	33069.0
172.4	**380**	837.7	376.5	**830**	1829.8	7257.6	**16000**	35273.6
176.9	**390**	859.8	381.0	**840**	1851.9	7711.1	**17000**	37478.2
181.4	**400**	881.8	385.6	**850**	1873.9	8164.7	**18000**	39682.8
186.0	**410**	903.9	390.1	**860**	1896.0	8618.3	**19000**	41887.4
190.5	**420**	925.9	394.6	**870**	1918.0	9071.9	**20000**	44092.0
195.0	**430**	948.0	399.2	**880**	1940.0	9525.5	**21000**	46296.6
199.6	**440**	970.0	403.7	**890**	1962.1	9979.1	**22000**	48501.2
204.1	**450**	992.1	408.2	**900**	1984.1	10432.7	**23000**	50705.8

Figure 8-5

RELATION OF TEMPERATURE (°C) TO ISA

ALTITUDE ~ 1000 FT	-50°C	-40°C	-30°C	-20°C	-10°C	ISA	+10°C	+20°C	+30°C
51	-106.5	-96.5	-86.5	-76.5	-66.5	**-56.5**	-46.5	-36.5	-26.5
37	-106.5	-96.5	-86.5	-76.5	-66.5	**-56.5**	-46.5	-36.5	-26.5
35	-104.2	-94.2	-84.2	-74.2	-64.2	**-54.2**	-44.2	-34.2	-24.2
33	-100.3	-90.3	-80.3	-70.3	-60.3	**-50.3**	-40.3	-30.3	-20.3
31	-96.3	-86.3	-76.3	-66.3	-56.3	**-46.3**	-36.3	-26.3	-16.3
30	-94.4	-84.4	-74.4	-64.4	-54.4	**-44.4**	-34.4	-24.4	-14.4
29	-92.4	-82.4	-72.4	-62.4	-52.4	**-42.4**	-32.4	-22.4	-12.4
28	-90.4	-80.4	-70.4	-60.4	-50.4	**-40.4**	-30.4	-20.4	-10.4
27	-88.4	-78.4	-68.4	-58.4	-48.4	**-38.4**	-28.4	-18.4	-8.4
26	-86.5	-76.5	-66.5	-56.5	-46.5	**-36.5**	-26.5	-16.5	-6.5
25	-84.5	-74.5	-64.5	-54.5	-44.5	**-34.5**	-24.5	-14.5	-4.5
24	-82.5	-72.5	-62.5	-52.5	-42.5	**-32.5**	-22.5	-12.5	-2.5
23	-80.5	-70.5	-60.5	-50.5	-40.5	**-30.5**	-20.5	-10.5	-0.5
22	-78.6	-68.6	-58.6	-48.6	-38.6	**-28.6**	-18.6	-8.6	1.4
21	-76.6	-66.6	-56.6	-46.6	-36.6	**-26.6**	-16.6	-6.6	3.4
20	-74.6	-64.6	-54.6	-44.6	-34.6	**-24.6**	-14.6	-4.6	5.4
19	-72.6	-62.6	-52.6	-42.6	-32.6	**-22.6**	-12.6	-2.6	7.4
18	-70.6	-60.6	-50.6	-40.6	-30.6	**-20.6**	-10.6	-0.6	9.4
16	-66.7	-56.7	-46.7	-36.7	-26.7	**-16.7**	-6.7	3.3	13.3
14	-62.7	-52.7	-42.7	-32.7	-22.7	**-12.7**	-2.7	7.3	17.3
12	-58.8	-48.8	-38.8	-28.8	-18.8	**-8.8**	1.2	11.2	21.2
10	-54.8	-44.8	-34.8	-24.8	-14.8	**-4.8**	5.2	15.2	25.2
8	-50.8	-40.8	-30.8	-20.8	-10.8	**-0.8**	9.2	19.2	29.2
6	-46.9	-36.9	-26.9	-16.9	-6.9	**3.1**	13.1	23.1	33.1
4	-42.9	-32.9	-22.9	-12.9	-2.9	**7.1**	17.1	27.1	37.1
2	-39.0	-29.0	-19.0	-9.0	1.0	**11.0**	21.0	31.0	41.0
S.L.	-35.0	-25.0	-15.0	-5.0	5.0	**15.0**	25.0	35.0	45.0
	-50°C	-40°C	-30°C	-20°C	-10°C	ISA	+10°C	+20°C	+30°C

Figure 8-6

SPEED/TEMPERATURE CONVERSION

RAM AIR TEMPERATURE (RAT) — °C		MACH — TRUE .60	.62	.64	.66	.68	.70	.72	.74	.76	.78	.80	.82
0	SAT	-18	-19	-20	-21	-23	-24	-25	-26	-28	-29	-30	-32
	KTAS	374	385	397	408	419	431	442	453	464	475	486	496
-5	SAT	-23	-24	-25	-26	-27	-28	-30	-31	-32	-34	-35	-36
	KTAS	370	381	293	404	416	427	438	449	460	470	481	492
-10	SAT	-27	-28	-30	-31	-32	-33	-34	-36	-37	-38	-39	-41
	KTAS	367	378	389	400	412	423	434	445	455	466	477	487
-15	SAT	-32	-33	-34	-35	-36	-38	-39	-40	-41	-42	-44	-45
	KTAS	363	374	386	397	408	418	429	440	451	462	474	483
-20	SAT	-37	-38	-39	-40	-41	-42	-43	-45	-46	-47	-48	-49
	KTAS	359	371	382	393	404	415	425	436	447	457	468	478
-25	SAT	-41	-42	-43	-45	-46	-47	-48	-49	-50	-51	-53	-54
	KTAS	356	367	378	389	399	410	421	432	443	453	463	473
-30	SAT	-46	-47	-48	-49	-50	-51	-52	-54	-55	-56	-57	-58
	KTAS	352	363	374	385	396	406	417	427	438	448	458	468
-35	SAT	-51	-52	-53	-54	-55	-56	-57	-58	-59	-60	-62	-63
	KTAS	349	359	370	381	391	402	413	423	434	444	453	463
-40	SAT	-55	-56	-57	-58	-59	-60	-62	-63	-64	-65	-66	-67
	KTAS	345	356	366	377	387	398	408	418	429	439	449	459
-45	SAT	-60	-61	-62	-63	-64	-65	-66	-67	-68	-69	-70	-72
	KTAS	341	352	362	373	383	394	404	414	424	434	444	453
-50	SAT	-65	-66	-67	-68	-69	-70	-71	-72	-73	-74	-75	-76
	KTAS	338	348	358	369	379	389	399	409	419	429	439	449
-55	SAT	-69	-70	-71	-72	-73	-74	-75	-76	-77	-78	-79	-80
	KTAS	334	344	355	365	375	385	395	405	415	425	435	444
-60	SAT	-74	-75	-76	-77	-78	-79	-80	-81	-82	-83	-84	-85
	KTAS	330	340	350	360	370	380	390	400	410	419	429	438
-65	SAT	-79	-80	-80	-81	-82	-83	-84	-85	-86	-87	-88	-89
	KTAS	326	336	347	357	366	376	386	396	405	415	424	434
-70	SAT	-83	-84	-85	-86	-87	-88	-89	-90	-91	-92	-93	-94
	KTAS	323	332	342	352	362	371	381	390	400	409	419	428
-75	SAT	-88	-89	-90	-91	-91	-92	-93	-94	-95	-96	-97	-98
	KTAS	318	328	338	347	358	367	377	386	395	405	414	423
-80	SAT	-93	-94	-94	-95	-96	-97	-98	-99	-100	-101	-102	-102
	KTAS	314	323	334	343	353	362	371	381	390	399	408	418
-85	SAT	-97	-98	-99	-100	-101	-101	-102	-103	-104	-105	-106	-107
	KTAS	310	320	329	339	348	358	367	376	385	394	403	412

Figure 8-7

CLIMB PERFORMANCE

CLIMB POWER SETTING

Figure 8-8 presents the climb maximum continuous thrust settings. At the start of the climb, the thrust levers are moved to the Maximum Continuous Thrust (MCT) position. When airborne with the flaps up, the FADEC will determine the proper maximum continuuous thrust N1 and position the N1 bug to that value. The N1 needle should align with the N1 bug.

CLIMB PERFORMANCE SCHEDULE

Figure 8-9 shows time, distance and fuel used to climb from sea level to altitude for standard and off-standard days at various weights. The climb weight used is the start-of-climb weight. Subtraction of performance values for two altitudes results in the time, distance and fuel required for climb between the two altitudes.

The climb speed schedule presented with each table is based upon an operational climb schedule to optimize fuel consumption and approximates the best rate-of-climb speeds. The climb speeds given are 250 KIAS up to 32,000 feet and 0.70 MI above 32,000 feet. Climb thrust is maximum continuous thrust (MCT).

MAXIMUM CONTINUOUS THRUST FOR CLIMB (N_1)
ALL ENGINE

ALTITUDE - 1000 FEET

STATIC AIR TEMPERATURE — °C

	S.L.	5	10	15	20	25	30	35	40	45	50	51
55	**88.23** 86.07											
50	**88.34** 86.19											
45	**89.07** 86.94	**89.11** 86.84										
40	**89.80** 87.69	**89.78** 87.53										
35	**90.51** 88.41	**90.48** 88.24	**90.42** 87.95									
30	**91.22** 89.14	**91.18** 88.96	**91.12** 88.67									
25	**91.99** 89.92	**91.90** 89.70	**91.81** 89.39	**91.80** 89.16								
20	**92.77** 90.72	**92.63** 90.45	**92.49** 90.08	**92.43** 89.82								
15	**92.55** 91.50	**93.37** 91.20	**93.16** 90.78	**93.03** 90.44	**92.96** 90.12							
10	**91.74** 91.74	**94.10** 91.96	**93.88** 91.52	**93.67** 91.11	**93.49** 90.67							
5	**90.93** 90.93	**94.83** 92.71	**94.60** 92.25	**94.37** 91.82	**94.10** 91.30	**93.73** 90.64						
0	**90.11** 90.11	**95.56** 93.45	**95.31** 92.99	**95.06** 92.54	**94.71** 91.94	**94.20** 91.14						
-5	**89.28** 89.28	**94.95** 94.20	**96.02** 93.72	**95.75** 93.26	**95.38** 92.64	**94.69** 91.65	**94.34** 91.02					
-10	**88.44** 88.44	**94.06** 94.06	**96.73** 94.45	**96.45** 93.97	**96.07** 93.35	**95.39** 92.38	**94.83** 91.54					
-15	**87.60** 87.60	**93.16** 93.16	**97.44** 95.19	**97.14** 94.69	**96.76** 94.07	**96.09** 93.11	**95.48** 92.22	**95.08** 91.54				
-20	**86.75** 86.75	**92.25** 92.25	**98.10** 95.86	**97.82** 95.39	**97.45** 94.79	**96.79** 93.84	**96.13** 92.90	**95.69** 92.18				
-25	**85.88** 85.88	**91.34** 91.34	**97.31** 96.50	**98.40** 96.00	**98.06** 95.43	**97.48** 94.56	**96.78** 93.59	**96.30** 92.83	**95.79** 91.99			
-30	**85.02** 85.02	**90.41** 90.41	**96.32** 96.32	**99.02** 96.64	**98.64** 96.03	**98.07** 95.18	**97.41** 94.25	**96.90** 93.47	**96.40** 92.64	**94.29** 90.27	**93.13** 88.90	**93.12** 88.86
-35	**84.14** 84.14	**89.48** 89.48	**95.33** 95.33	**100.21** 97.86	**99.57** 96.99	**98.66** 95.80	**98.01** 94.88	**97.51** 94.11	**97.01** 93.29	**94.91** 90.93	**93.75** 89.57	**93.74** 89.52
-40	**83.25** 83.25	**88.53** 88.53	**94.32** 94.32	**101.41** 99.09	**100.79** 98.23	**99.87** 97.04	**98.78** 95.68	**98.11** 94.75	**97.62** 93.94	**95.52** 91.58	**94.37** 90.23	**94.36** 90.19
-45	**82.35** 82.35	**87.58** 87.58	**93.31** 93.31	**101.68** 99.38	**101.52** 99.00	**101.10** 98.30	**100.03** 96.97	**99.30** 95.98	**98.82** 95.17	**96.72** 92.83	**95.57** 91.48	**95.57** 91.44
-50	**81.44** 81.44	**86.61** 86.61	**92.28** 92.28	**101.35** 99.59	**101.71** 99.21	**101.39** 98.62	**101.05** 98.02	**100.57** 97.28	**100.08** 96.48	**98.00** 94.14	**96.85** 92.80	**96.85** 92.77
-55	**80.53** 80.53	**85.64** 85.64	**91.24** 91.24	**100.21** 99.80	**101.90** 99.43	**101.59** 98.85	**101.24** 98.25	**100.92** 97.66	**100.44** 96.87	**98.36** 94.55	**97.22** 93.22	**97.21** 93.18
-60	**79.60** 79.60	**84.65** 84.65	**90.19** 90.19	**99.05** 99.05	**101.00** 99.65	**101.62** 99.07	**101.44** 98.49	**101.12** 97.90	**100.65** 97.12	**98.57** 94.81	**97.44** 93.48	**97.44** 93.45
-65						**100.42** 99.30	**101.18** 98.72	**101.32** 98.15	**100.86** 97.38	**98.79** 95.07	**97.66** 93.75	**97.66** 93.72
-70							**99.96** 98.95	**100.36** 98.39	**100.36** 97.63	**99.00** 95.33	**97.88** 94.02	**97.88** 93.98

60-096

LR-60-PM-R5

XX.XX ANTI-ICE OFF

XX.XX FULL ANTI-ICE ON

SPEED SCHEDULE
- 250 KIAS up to 32,000 ft
- .70 M_I above 32,000 ft

Figure 8-8

CLIMB PERFORMANCE
TWO ENGINE

WEIGHT 14,000 Lb	ISA -10°C			ISA			ISA +10°C			ISA +15°C			ISA +20°C		
PRESSURE ALTITUDE — 1000 FEET	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb
51	14.4	89.4	418.7	20.4	130.5	509.6									
49	11.2	68.0	371.2	13.6	85.0	416.5	19.9	128.9	516.3						
47	9.4	56.7	343.0	11.2	68.8	379.2	14.5	91.7	440.7	18.4	118.6	502.3	24.2	159.8	592.7
45	8.3	49.0	321.4	9.7	58.8	353.3	12.2	75.7	403.7	14.5	91.5	445.0	17.2	110.8	495.1
43	7.4	43.2	303.3	8.6	51.6	332.4	10.7	65.6	377.2	12.4	77.2	410.8	14.4	91.3	451.3
41	6.7	38.6	287.2	7.8	46.0	314.4	9.6	58.3	355.6	11.0	67.6	385.0	12.7	79.2	420.5
39	6.1	34.7	272.4	7.1	41.5	297.9	8.8	52.4	336.5	10.0	60.5	363.2	11.4	70.3	395.4
37	5.6	31.4	258.4	6.5	37.6	282.6	8.1	47.6	319.0	9.1	54.6	343.5	10.4	63.2	373.1
35	5.2	28.7	245.5	6.0	34.4	268.5	7.5	43.6	303.0	8.4	49.8	325.8	9.6	57.5	353.2
33	4.8	26.1	232.8	5.6	31.4	254.5	6.9	39.8	286.9	7.8	45.3	308.0	8.8	52.1	333.3
31	4.3	23.3	217.4	5.1	27.9	237.3	6.3	35.2	266.6	7.0	40.0	285.5	7.9	45.7	308.0
29	3.9	20.6	201.7	4.6	24.7	219.9	5.6	30.9	246.2	6.3	35.0	263.1	7.1	39.8	282.8
27	3.5	18.2	186.7	4.2	21.8	203.3	5.1	27.2	227.0	5.6	30.7	242.1	6.3	34.7	259.5
25	3.2	16.1	172.4	3.7	19.3	187.4	4.6	24.0	208.7	5.1	26.9	222.2	5.6	30.3	237.5
23	2.9	14.2	158.3	3.4	17.0	171.9	4.1	21.0	191.0	4.5	23.5	202.9	5.0	26.4	216.3
21	2.6	12.5	144.5	3.0	14.9	156.6	3.6	18.3	173.6	4.0	20.4	184.1	4.4	22.9	196.0
19	2.3	10.9	130.9	2.7	13.0	141.6	3.2	15.9	156.6	3.5	17.7	165.8	3.9	19.7	176.3
17	2.0	9.5	117.4	2.3	11.2	126.7	2.8	13.6	139.8	3.1	15.2	147.9	3.4	16.9	157.1
15	1.8	8.1	103.9	2.0	9.5	111.8	2.4	11.6	123.3	2.7	12.9	130.3	2.9	14.3	138.2
13	1.5	6.9	90.4	1.7	8.0	97.1	2.1	9.7	106.8	2.3	10.7	112.9	2.5	11.9	119.5
11	1.3	5.7	76.9	1.4	6.5	82.3	1.7	7.9	90.4	1.9	8.8	95.5	2.1	9.7	101.0
9	1.0	4.6	63.4	1.2	5.2	67.5	1.4	6.2	74.1	1.5	6.9	78.2	1.6	7.7	82.6
7	0.8	3.5	49.7	0.9	3.9	52.8	1.0	4.7	57.8	1.1	5.2	60.9	1.3	5.7	64.2
5	0.6	2.5	35.9	0.6	2.7	38.0	0.7	3.3	41.4	0.8	3.6	43.6	0.9	4.0	45.9
3	0.4	1.5	21.9	0.4	1.6	23.0	0.4	1.9	25.0	0.5	2.1	26.2	0.5	2.3	27.5
1	0.1	0.5	7.4	0.1	0.5	7.8	0.1	0.6	8.4	0.2	0.7	8.8	0.2	0.7	9.2

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 1 of 12)

CLIMB PERFORMANCE
TWO ENGINE

WEIGHT 15,000 Lb	ISA -10°C			ISA			ISA +10°C			ISA +15°C			ISA +20°C		
PRESSURE ALTITUDE — 1000 FEET	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb
51	20.0	125.5	518.6												
49	12.9	78.8	415.4	16.3	102.3	475.7									
47	10.5	63.4	377.1	12.6	77.8	419.5	16.9	107.2	496.7	23.5	153.3	598.5			
45	9.1	54.0	350.8	10.7	65.2	386.8	13.6	84.9	445.2	16.5	104.7	496.4	20.2	130.5	561.6
43	8.1	47.2	329.5	9.4	56.6	362.0	11.8	72.4	412.4	13.7	85.9	451.3	16.2	102.6	498.8
41	7.2	41.9	311.2	8.5	50.2	341.1	10.5	63.7	386.9	12.1	74.3	420.1	14.0	87.4	460.5
39	6.6	37.7	294.5	7.7	45.0	322.6	9.5	57.1	365.2	10.9	66.0	394.9	12.5	77.0	430.9
37	6.0	34.0	279.0	7.1	40.7	305.5	8.7	51.7	345.5	9.9	59.4	372.7	11.3	68.9	405.5
35	5.6	31.0	264.9	6.5	37.2	290.0	8.1	47.2	327.9	9.2	54.1	353.0	10.4	62.5	383.3
33	5.1	28.2	251.1	6.1	33.9	274.8	7.5	43.1	310.3	8.4	49.1	333.4	9.6	56.6	361.3
31	4.7	25.1	234.3	5.5	30.2	256.0	6.8	38.1	288.1	7.6	43.3	308.8	8.6	49.5	333.5
29	4.2	22.2	217.4	5.0	26.6	237.2	6.1	33.4	266.0	6.8	37.8	284.4	7.7	43.1	306.1
27	3.8	19.6	201.2	4.5	23.5	219.3	5.5	29.4	245.2	6.1	33.1	261.6	6.8	37.6	280.7
25	3.4	17.3	185.7	4.0	20.8	202.1	4.9	25.9	225.3	5.5	29.1	240.0	6.1	32.8	256.8
23	3.1	15.3	170.5	3.6	18.3	185.2	4.4	22.7	206.1	4.9	25.4	219.0	5.4	28.5	233.8
21	2.8	13.5	155.6	3.2	16.0	168.7	3.9	19.8	187.3	4.3	22.1	198.7	4.8	24.7	211.7
19	2.5	11.8	140.9	2.9	14.0	152.5	3.4	17.1	168.9	3.8	19.1	178.9	4.2	21.3	190.3
17	2.2	10.2	126.4	2.5	12.1	136.4	3.0	14.7	150.8	3.3	16.4	159.6	3.7	18.2	169.5
15	1.9	8.8	111.8	2.2	10.3	120.5	2.6	12.5	132.9	2.9	13.9	140.5	3.2	15.4	149.1
13	1.6	7.4	97.3	1.9	8.6	104.5	2.2	10.4	115.1	2.4	11.6	121.7	2.7	12.9	129.0
11	1.4	6.1	82.8	1.5	7.1	88.6	1.8	8.5	97.5	2.0	9.4	102.9	2.2	10.5	109.0
9	1.1	4.9	68.2	1.2	5.6	72.7	1.5	6.7	79.9	1.6	7.5	84.3	1.8	8.3	89.1
7	0.9	3.8	53.5	1.0	4.2	56.8	1.1	5.1	62.3	1.2	5.6	65.6	1.4	6.2	69.3
5	0.6	2.7	38.7	0.7	2.9	40.9	0.8	3.5	44.6	0.9	3.9	47.0	0.9	4.3	49.5
3	0.4	1.6	23.6	0.4	1.7	24.8	0.5	2.0	26.9	0.5	2.2	28.2	0.6	2.5	29.7
1	0.1	0.5	8.0	0.1	0.6	8.3	0.2	0.7	9.0	0.2	0.7	9.4	0.2	0.8	9.9

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 2 of 12)

CLIMB PERFORMANCE
TWO ENGINE

WEIGHT 16,000 Lb	ISA -10°C			ISA			ISA +10°C			ISA +15°C			ISA +20°C		
PRESSURE ALTITUDE — 1000 FEET	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb
51															
49	15.5	95.4	474.7	22.1	141.1	585.3									
47	11.8	71.5	415.6	14.4	89.3	467.0	20.6	132.2	576.0						
45	10.0	59.6	382.4	11.9	72.4	423.5	15.3	96.0	492.4	19.2	122.6	560.1	24.9	163.0	658.4
43	8.8	51.6	357.3	10.3	62.1	393.5	13.0	80.0	450.6	15.3	96.0	496.5	18.3	116.4	553.9
41	7.9	45.5	336.2	9.2	54.6	369.2	11.5	69.7	420.2	13.2	81.7	457.9	15.5	96.8	504.3
39	7.1	40.7	317.5	8.3	48.8	348.2	10.4	62.1	395.2	11.8	72.0	428.5	13.7	84.3	469.0
37	6.5	36.7	300.3	7.6	44.0	329.2	9.5	55.9	373.2	10.8	64.5	403.3	12.3	75.0	439.7
35	6.0	33.3	284.8	7.0	40.1	312.2	8.7	51.0	353.6	9.9	58.5	381.3	11.3	67.8	414.7
33	5.5	30.3	269.7	6.5	36.5	295.5	8.1	46.5	334.3	9.1	53.1	359.7	10.4	61.2	390.3
31	5.0	27.0	251.6	5.9	32.4	275.2	7.3	41.1	310.2	8.2	46.7	332.9	9.3	53.5	359.9
29	4.5	23.8	233.4	5.3	28.6	254.8	6.6	36.0	286.2	7.3	40.8	306.3	8.3	46.5	330.1
27	4.1	21.1	215.9	4.8	25.3	235.5	5.9	31.7	263.7	6.6	35.7	281.7	7.4	40.5	302.5
25	3.7	18.6	199.2	4.3	22.3	217.0	5.3	27.8	242.3	5.9	31.3	258.2	6.6	35.3	276.6
23	3.3	16.4	182.9	3.9	19.7	198.9	4.7	24.4	221.5	5.2	27.3	235.6	5.8	30.7	251.7
21	3.0	14.4	166.9	3.5	17.2	181.1	4.2	21.2	201.2	4.6	23.7	213.7	5.2	26.6	227.8
19	2.6	12.6	151.1	3.1	15.0	163.6	3.7	18.4	181.4	4.1	20.5	192.3	4.5	22.9	204.7
17	2.3	10.9	135.5	2.7	12.9	146.4	3.2	15.8	161.9	3.6	17.6	171.5	3.9	19.6	182.3
15	2.0	9.4	119.9	2.3	11.0	129.2	2.8	13.4	142.7	3.1	14.9	151.0	3.4	16.6	160.3
13	1.7	7.9	104.3	2.0	9.2	112.1	2.4	11.2	123.6	2.6	12.4	130.7	2.9	13.8	138.6
11	1.5	6.6	88.7	1.7	7.6	95.0	2.0	9.1	104.6	2.2	10.1	110.5	2.4	11.3	117.1
9	1.2	5.3	73.1	1.3	6.0	78.0	1.6	7.2	85.7	1.7	8.0	90.5	1.9	8.9	95.7
7	0.9	4.0	57.3	1.0	4.5	60.9	1.2	5.4	66.8	1.3	6.0	70.5	1.5	6.6	74.4
5	0.7	2.9	41.4	0.7	3.2	43.8	0.9	3.8	47.9	0.9	4.2	50.4	1.0	4.6	53.1
3	0.4	1.7	25.3	0.4	1.9	26.5	0.5	2.2	28.8	0.5	2.4	30.3	0.6	2.6	31.9
1	0.1	0.6	8.6	0.1	0.6	8.9	0.2	0.7	9.7	0.2	0.8	10.1	0.2	0.8	10.6

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 3 of 12)

CLIMB PERFORMANCE
TWO ENGINE

WEIGHT 17,000 Lb	ISA -10°C			ISA			ISA +10°C			ISA +15°C			ISA +20°C		
PRESSURE ALTITUDE — 1000 FEET	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb
51															
49	21.7	135.6	593.8												
47	13.5	82.0	461.7	17.0	106.0	529.2									
45	11.1	66.1	417.3	13.2	81.0	464.9	17.5	110.3	549.5	23.6	152.4	653.7			
43	9.6	56.4	387.1	11.3	68.2	427.7	14.4	88.8	493.3	17.2	108.4	549.0	21.0	134.8	622.0
41	8.5	49.4	362.7	10.0	59.4	399.3	12.5	76.3	456.5	14.6	90.1	499.7	17.1	107.8	553.9
39	7.7	44.0	341.6	9.0	52.8	375.4	11.2	67.5	427.5	12.9	78.6	464.8	15.0	92.6	510.8
37	7.0	39.5	322.5	8.2	47.4	354.1	10.2	60.6	402.5	11.7	70.0	436.0	13.4	81.8	476.8
35	6.4	35.8	305.5	7.6	43.1	335.3	9.4	55.1	380.8	10.7	63.4	411.4	12.3	73.6	448.6
33	5.9	32.6	289.1	7.0	39.3	317.1	8.7	50.1	359.6	9.8	57.3	387.6	11.2	66.3	421.4
31	5.4	28.9	269.5	6.3	34.8	295.1	7.9	44.2	333.3	8.8	50.3	358.2	10.0	57.8	387.9
29	4.9	25.5	249.8	5.7	30.7	273.0	7.0	38.7	307.2	7.9	43.9	329.2	8.9	50.1	355.2
27	4.4	22.5	231.0	5.2	27.1	252.2	6.3	34.0	282.9	7.1	38.4	302.5	7.9	43.6	325.3
25	4.0	19.9	213.1	4.6	23.9	232.3	5.7	29.9	259.7	6.3	33.6	277.1	7.1	38.0	297.1
23	3.6	17.6	195.6	4.2	21.0	212.8	5.1	26.1	237.4	5.6	29.3	252.7	6.3	33.0	270.2
21	3.2	15.4	178.4	3.7	18.4	193.7	4.5	22.8	215.6	5.0	25.4	229.1	5.5	28.6	244.4
19	2.8	13.5	161.5	3.3	16.0	175.0	4.0	19.7	194.2	4.4	22.0	206.1	4.9	24.6	219.6
17	2.5	11.7	144.7	2.9	13.8	156.5	3.5	16.9	173.3	3.8	18.8	183.7	4.2	21.0	195.4
15	2.2	10.0	128.1	2.5	11.8	138.1	3.0	14.4	152.7	3.3	16.0	161.7	3.6	17.8	171.8
13	1.9	8.5	111.4	2.1	9.9	119.8	2.5	12.0	132.2	2.8	13.3	139.9	3.1	14.8	148.5
11	1.6	7.0	94.8	1.8	8.1	101.5	2.1	9.8	111.9	2.3	10.8	118.3	2.6	12.1	125.4
9	1.3	5.6	78.1	1.4	6.4	83.3	1.7	7.7	91.6	1.9	8.6	96.8	2.0	9.5	102.4
7	1.0	4.3	61.2	1.1	4.8	65.0	1.3	5.8	71.4	1.4	6.4	75.4	1.6	7.1	79.6
5	0.7	3.1	44.3	0.8	3.4	46.8	0.9	4.0	51.2	1.0	4.4	53.9	1.1	4.9	56.8
3	0.4	1.8	27.0	0.5	2.0	28.3	0.5	2.3	30.8	0.6	2.6	32.4	0.6	2.8	34.1
1	0.1	0.6	9.2	0.2	0.7	9.5	0.2	0.8	10.3	0.2	0.8	10.8	0.2	0.9	11.4

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 4 of 12)

CLIMB PERFORMANCE
TWO ENGINE

WEIGHT 18,000 Lb	ISA -10°C Time Min.	ISA -10°C Dist. N.M.	ISA -10°C Fuel Lb	ISA Time Min.	ISA Dist. N.M.	ISA Fuel Lb	ISA +10°C Time Min.	ISA +10°C Dist. N.M.	ISA +10°C Fuel Lb	ISA +15°C Time Min.	ISA +15°C Dist. N.M.	ISA +15°C Fuel Lb	ISA +20°C Time Min.	ISA +20°C Dist. N.M.	ISA +20°C Fuel Lb
PRESSURE ALTITUDE — 1000 FEET															
51															
49															
47	16.0	97.8	523.5	22.3	141.0	639.8									
45	12.3	73.7	456.8	14.9	91.8	513.7	20.7	131.9	627.0						
43	10.5	61.8	419.4	12.4	75.2	465.4	16.0	99.3	542.0	19.6	124.5	612.9	25.1	162.6	715.9
41	9.2	53.6	391.0	10.9	64.7	431.7	13.7	83.8	496.2	16.1	99.9	546.7	19.2	121.2	611.6
39	8.3	47.5	367.1	9.7	57.1	404.3	12.2	73.4	462.3	14.1	86.0	504.6	16.4	102.0	557.4
37	7.5	42.5	345.8	8.8	51.1	380.4	11.1	65.6	433.9	12.6	76.1	471.3	14.6	89.3	517.4
35	6.9	38.4	327.1	8.1	46.4	359.7	10.2	59.5	409.8	11.6	68.6	443.7	13.3	80.0	485.2
33	6.4	34.9	309.2	7.5	42.1	339.8	9.4	54.0	386.4	10.6	61.9	417.3	12.1	71.8	454.9
31	5.8	30.9	288.0	6.8	37.3	315.8	8.4	47.5	357.7	9.5	54.2	384.9	10.8	62.4	417.8
29	5.2	27.3	266.8	6.1	32.9	292.0	7.6	41.5	329.3	8.5	47.2	353.4	9.6	54.0	381.9
27	4.7	24.1	246.6	5.5	29.0	269.6	6.8	36.4	302.9	7.6	41.2	324.3	8.5	46.9	349.3
25	4.2	21.2	227.3	5.0	25.6	248.1	6.1	32.0	278.0	6.8	36.0	296.9	7.6	40.8	318.8
23	3.8	18.7	208.6	4.4	22.5	227.2	5.4	28.0	253.9	6.0	31.4	270.6	6.7	35.4	289.7
21	3.4	16.4	190.2	4.0	19.7	206.8	4.8	24.4	230.4	5.3	27.2	245.1	5.9	30.6	261.8
19	3.0	14.4	172.1	3.5	17.1	186.8	4.2	21.1	207.6	4.7	23.5	220.4	5.2	26.4	235.1
17	2.7	12.5	154.3	3.1	14.8	167.0	3.7	18.1	185.1	4.1	20.1	196.4	4.5	22.5	209.2
15	2.3	10.7	136.5	2.7	12.6	147.3	3.2	15.3	163.0	3.5	17.1	172.8	3.9	19.0	183.8
13	2.0	9.0	118.7	2.3	10.5	127.7	2.7	12.8	141.1	3.0	14.2	149.5	3.3	15.8	158.7
11	1.7	7.5	101.0	1.9	8.6	108.2	2.2	10.4	119.4	2.5	11.6	126.4	2.7	12.9	134.0
9	1.4	6.0	83.1	1.5	6.8	88.8	1.8	8.2	97.8	2.0	9.1	103.4	2.2	10.1	109.5
7	1.1	4.6	65.2	1.2	5.2	69.3	1.4	6.2	76.2	1.5	6.9	80.4	1.7	7.6	85.0
5	0.8	3.3	47.1	0.8	3.6	49.9	1.0	4.3	54.5	1.1	4.7	57.5	1.2	5.2	60.7
3	0.5	2.0	28.7	0.5	2.1	30.2	0.6	2.5	32.9	0.6	2.7	34.6	0.7	3.0	36.4
1	0.2	0.7	9.8	0.2	0.7	10.2	0.2	0.8	11.0	0.2	0.9	11.5	0.2	1.0	12.1

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 5 of 12)

CLIMB PERFORMANCE

TWO ENGINE

WEIGHT 19,000 Lb		ISA -10°C			ISA			ISA +10°C			ISA +15°C			ISA +20°C		
		Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb
PRESSURE ALTITUDE — 1000 FEET	51															
	49															
	47	21.4	132.5	639.1												
	45	13.9	83.5	503.6	17.3	107.0	576.4	28.1	181.3	778.3						
	43	11.5	67.9	454.8	13.7	83.3	507.7	18.0	112.5	599.7	23.2	148.3	699.4			
	41	10.0	58.3	421.3	11.8	70.6	466.7	15.1	92.3	540.4	17.9	111.5	600.5	21.7	138.2	681.2
	39	8.9	51.2	394.1	10.5	61.8	435.1	13.3	79.9	500.0	15.4	94.3	548.5	18.1	113.0	609.9
	37	8.1	45.6	370.3	9.5	55.1	408.3	11.9	71.0	467.6	13.7	82.7	509.6	16.0	97.7	562.0
	35	7.4	41.2	349.7	8.7	49.8	385.3	11.0	64.2	440.6	12.5	74.3	478.4	14.4	87.0	525.0
	33	6.8	37.3	330.2	8.0	45.2	363.6	10.1	58.1	414.8	11.4	66.9	448.9	13.1	77.8	490.9
	31	6.2	33.0	307.3	7.3	39.9	337.5	9.1	51.0	383.3	10.2	58.3	413.3	11.7	67.4	449.7
	29	5.5	29.1	284.3	6.5	35.1	311.7	8.1	44.5	352.4	9.1	50.7	378.8	10.3	58.1	410.2
	27	5.0	25.7	262.7	5.9	30.9	287.6	7.2	39.0	323.9	8.1	44.2	347.2	9.1	50.4	374.6
	25	4.5	22.6	242.0	5.3	27.3	264.5	6.5	34.2	297.0	7.2	38.6	317.6	8.1	43.7	341.5
	23	4.0	19.9	222.0	4.7	24.0	242.2	5.8	29.9	271.1	6.4	33.6	289.2	7.2	37.9	310.1
	21	3.6	17.5	202.4	4.2	21.0	220.3	5.1	26.0	245.9	5.7	29.1	261.8	6.3	32.8	280.1
	19	3.2	15.3	183.1	3.7	18.2	198.9	4.5	22.5	221.4	5.0	25.1	235.4	5.6	28.2	251.3
	17	2.8	13.2	164.0	3.3	15.7	177.7	3.9	19.3	197.4	4.4	21.5	209.6	4.8	24.1	223.4
	15	2.5	11.4	145.1	2.8	13.4	156.8	3.4	16.3	173.7	3.8	18.2	184.3	4.2	20.3	196.2
	13	2.1	9.6	126.2	2.4	11.2	135.9	2.9	13.6	150.3	3.2	15.2	159.4	3.5	16.9	169.4
	11	1.8	7.9	107.3	2.0	9.2	115.1	2.4	11.1	127.1	2.6	12.4	134.7	2.9	13.7	143.0
	9	1.4	6.4	88.4	1.6	7.3	94.4	1.9	8.8	104.1	2.1	9.7	110.1	2.3	10.8	116.7
	7	1.1	4.9	69.3	1.2	5.5	73.7	1.5	6.6	81.1	1.6	7.3	85.7	1.8	8.1	90.7
	5	0.8	3.5	50.1	0.9	3.8	53.0	1.0	4.6	58.0	1.1	5.1	61.2	1.2	5.6	64.7
	3	0.5	2.1	30.5	0.5	2.3	32.1	0.6	2.7	34.9	0.7	2.9	36.8	0.7	3.2	38.8
	1	0.2	0.7	10.4	0.2	0.7	10.8	0.2	0.9	11.7	0.2	0.9	12.3	0.2	1.0	12.9

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 6 of 12)

CLIMB PERFORMANCE
TWO ENGINE

WEIGHT 20,000 Lb	ISA -10°C			ISA			ISA +10°C			ISA +15°C			ISA +20°C		
PRESSURE ALTITUDE — 1000 FEET	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb
51															
49															
47															
45	16.0	97.3	564.3	21.5	134.5	675.6									
43	12.6	75.0	494.7	15.3	93.2	556.8	20.8	130.7	673.8	30.7	199.3	860.3			
41	10.8	63.3	454.0	12.9	77.2	505.1	16.6	102.2	590.1	20.1	125.8	664.0	25.3	161.7	771.2
39	9.6	55.3	422.8	11.4	67.0	468.2	14.4	87.3	541.3	16.9	103.8	597.4	20.1	126.0	670.3
37	8.6	49.0	396.1	10.2	59.3	437.8	12.9	76.9	503.8	14.9	90.1	551.4	17.5	107.3	611.4
35	7.9	44.1	373.4	9.4	53.5	412.4	11.8	69.2	473.4	13.5	80.5	515.7	15.7	94.8	568.5
33	7.3	39.9	352.1	8.6	48.4	388.5	10.8	62.5	444.9	12.3	72.2	482.8	14.2	84.4	529.8
31	6.6	35.3	327.2	7.8	42.7	360.1	9.7	54.7	410.3	11.0	62.8	443.4	12.6	72.8	483.8
29	5.9	31.0	302.5	7.0	37.5	332.3	8.7	47.7	376.6	9.8	54.3	405.6	11.1	62.5	440.3
27	5.3	27.3	279.3	6.3	33.0	306.3	7.7	41.7	345.8	8.7	47.3	371.3	9.8	54.1	401.4
25	4.8	24.1	257.2	5.6	29.0	281.6	6.9	36.5	316.8	7.7	41.3	339.3	8.7	46.9	365.5
23	4.3	21.2	235.8	5.0	25.5	257.6	6.2	31.9	289.0	6.9	35.9	308.7	7.7	40.6	331.5
21	3.8	18.6	214.9	4.5	22.3	234.3	5.5	27.7	262.0	6.1	31.1	279.3	6.8	35.0	299.1
19	3.4	16.2	194.4	4.0	19.4	211.4	4.8	24.0	235.7	5.3	26.8	250.9	5.9	30.1	268.2
17	3.0	14.1	174.1	3.5	16.7	188.9	4.2	20.5	210.1	4.6	22.9	223.3	5.2	25.7	238.3
15	2.6	12.1	154.0	3.0	14.2	166.5	3.6	17.4	184.8	4.0	19.4	196.3	4.4	21.7	209.2
13	2.2	10.2	133.9	2.6	11.9	144.3	3.1	14.5	159.9	3.4	16.1	169.7	3.8	18.0	180.6
11	1.9	8.4	113.8	2.1	9.7	122.2	2.5	11.8	135.2	2.8	13.1	143.3	3.1	14.6	152.3
9	1.5	6.8	93.7	1.7	7.7	100.2	2.0	9.3	110.6	2.3	10.4	117.2	2.5	11.5	124.3
7	1.2	5.2	73.5	1.3	5.8	78.2	1.6	7.0	86.1	1.7	7.8	91.1	1.9	8.6	96.5
5	0.9	3.7	53.1	0.9	4.1	56.3	1.1	4.9	61.7	1.2	5.4	65.1	1.3	5.9	68.8
3	0.5	2.2	32.4	0.6	2.4	34.1	0.6	2.8	37.1	0.7	3.1	39.1	0.8	3.4	41.2
1	0.2	0.7	11.0	0.2	0.8	11.5	0.2	0.9	12.4	0.2	1.0	13.0	0.3	1.1	13.7

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 7 of 12)

CLIMB PERFORMANCE

TWO ENGINE

WEIGHT 21,000 Lb	ISA -10°C			ISA			ISA +10°C			ISA +15°C			ISA +20°C		
PRESSURE ALTITUDE — 1000 FEET	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb
51															
49															
47															
45	20.0	122.8	662.3												
43	14.0	83.8	541.1	17.3	106.4	617.5	25.7	164.0	793.3						
41	11.8	69.1	489.7	14.1	84.8	547.8	18.5	114.2	648.0	23.0	145.2	744.3	31.2	202.5	911.9
39	10.3	59.7	453.4	12.3	72.6	503.9	15.7	95.5	586.9	18.6	114.9	652.9	22.6	142.1	741.9
37	9.3	52.6	423.4	11.0	63.9	469.3	14.0	83.4	543.2	16.2	98.5	597.5	19.2	118.3	667.2
35	8.4	47.2	398.2	10.0	57.4	440.9	12.7	74.8	508.8	14.6	87.3	556.4	17.1	103.6	616.5
33	7.7	42.6	375.0	9.2	51.8	414.7	11.6	67.3	477.0	13.3	78.0	519.3	15.4	91.7	572.2
31	7.0	37.6	348.1	8.3	45.6	383.8	10.4	58.7	438.9	11.8	67.5	475.5	13.5	78.6	520.6
29	6.3	33.0	321.4	7.4	39.9	353.6	9.3	51.0	402.1	10.4	58.3	434.0	11.9	67.3	472.3
27	5.6	29.0	296.5	6.7	35.1	325.6	8.3	44.5	368.7	9.3	50.6	396.7	10.5	58.0	429.7
25	5.1	25.5	272.9	6.0	30.9	299.2	7.4	38.9	337.5	8.3	44.1	362.1	9.3	50.2	390.7
23	4.6	22.5	250.1	5.4	27.1	273.6	6.6	34.0	307.6	7.3	38.3	329.1	8.2	43.4	354.0
21	4.1	19.7	227.8	4.8	23.7	248.7	5.8	29.5	278.7	6.5	33.1	297.5	7.2	37.4	319.2
19	3.6	17.2	206.0	4.2	20.6	224.3	5.1	25.5	250.7	5.7	28.5	267.1	6.3	32.1	286.0
17	3.2	14.9	184.4	3.7	17.7	200.3	4.5	21.8	223.3	4.9	24.4	237.6	5.5	27.4	253.9
15	2.8	12.8	163.1	3.2	15.1	176.5	3.9	18.5	196.3	4.3	20.6	208.7	4.7	23.1	222.7
13	2.4	10.8	141.8	2.7	12.6	152.9	3.3	15.4	169.8	3.6	17.2	180.3	4.0	19.2	192.1
11	2.0	8.9	120.5	2.3	10.3	129.5	2.7	12.5	143.5	3.0	14.0	152.3	3.3	15.6	162.0
9	1.6	7.2	99.2	1.8	8.2	106.1	2.2	9.9	117.4	2.4	11.0	124.4	2.6	12.2	132.1
7	1.3	5.5	77.8	1.4	6.2	82.8	1.7	7.4	91.4	1.8	8.3	96.7	2.0	9.2	102.5
5	0.9	3.9	56.2	1.0	4.3	59.5	1.2	5.1	65.4	1.3	5.7	69.1	1.4	6.3	73.1
3	0.6	2.3	34.3	0.6	2.5	36.0	0.7	3.0	39.3	0.7	3.3	41.5	0.8	3.6	43.8
1	0.2	0.8	11.6	0.2	0.8	12.1	0.2	1.0	13.2	0.2	1.1	13.8	0.3	1.2	14.6

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 8 of 12)

CLIMB PERFORMANCE
TWO ENGINE

WEIGHT 22,000 Lb	ISA -10°C			ISA			ISA +10°C			ISA +15°C			ISA +20°C		
PRESSURE ALTITUDE — 1000 FEET	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb
51															
49															
47															
45															
43	15.9	95.5	598.7	20.5	127.0	703.4									
41	12.9	75.6	529.4	15.6	93.8	596.6	20.9	129.9	719.1	27.7	176.8	863.3			
39	11.2	64.5	486.4	13.3	78.9	542.9	17.2	105.0	637.9	20.7	128.3	717.3	25.8	163.1	830.9
37	9.9	56.5	452.4	11.8	68.9	503.2	15.2	90.7	586.2	17.7	107.9	648.8	21.2	131.3	731.2
35	9.0	50.5	424.5	10.7	61.6	471.4	13.7	80.8	547.0	15.9	95.0	600.8	18.7	113.6	670.1
33	8.2	45.4	399.0	9.8	55.4	442.4	12.5	72.4	511.4	14.3	84.3	558.8	16.7	99.8	618.8
31	7.4	40.0	369.8	8.8	48.7	408.7	11.1	63.0	469.3	12.7	72.7	509.9	14.6	85.0	560.4
29	6.7	35.0	341.1	7.9	42.5	376.0	9.9	54.5	429.1	11.2	62.5	464.1	12.8	72.4	506.7
27	6.0	30.8	314.3	7.1	37.3	345.9	8.8	47.5	392.9	9.9	54.1	423.5	11.3	62.2	459.9
25	5.4	27.1	289.2	6.4	32.8	317.6	7.9	41.5	359.3	8.8	47.1	386.1	10.0	53.7	417.6
23	4.8	23.8	264.8	5.7	28.8	290.3	7.0	36.1	327.2	7.8	40.8	350.6	8.8	46.3	377.8
21	4.3	20.9	241.2	5.1	25.1	263.7	6.2	31.4	296.2	6.9	35.3	316.7	7.7	39.9	340.3
19	3.8	18.2	218.0	4.5	21.8	237.7	5.4	27.1	266.2	6.0	30.4	284.1	6.7	34.2	304.6
17	3.4	15.8	195.1	3.9	18.8	212.2	4.7	23.2	237.0	5.3	25.9	252.5	5.9	29.2	270.3
15	2.9	13.5	172.4	3.4	16.0	187.0	4.1	19.6	208.3	4.5	21.9	221.7	5.0	24.6	236.9
13	2.5	11.4	149.9	2.9	13.4	161.9	3.5	16.3	180.0	3.8	18.2	191.4	4.2	20.4	204.2
11	2.1	9.4	127.4	2.4	10.9	137.0	2.9	13.3	152.1	3.2	14.8	161.6	3.5	16.6	172.1
9	1.7	7.6	104.8	1.9	8.6	112.3	2.3	10.5	124.4	2.5	11.7	132.0	2.8	13.0	140.3
7	1.3	5.8	82.2	1.5	6.5	87.6	1.8	7.9	96.8	1.9	8.8	102.6	2.1	9.7	108.8
5	1.0	4.1	59.4	1.0	4.5	63.0	1.2	5.4	69.2	1.4	6.0	73.2	1.5	6.7	77.5
3	0.6	2.5	36.2	0.6	2.7	38.1	0.7	3.2	41.6	0.8	3.5	43.9	0.9	3.9	46.4
1	0.2	0.8	12.3	0.2	0.9	12.8	0.2	1.0	13.9	0.3	1.1	14.6	0.3	1.2	15.4

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 9 of 12)

CLIMB PERFORMANCE
TWO ENGINE

WEIGHT 22,750 Lb	ISA -10°C			ISA			ISA +10°C			ISA +15°C			ISA +20°C		
PRESSURE ALTITUDE — 1000 FEET	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb
51															
49															
47															
45															
43	17.9	108.2	656.1	25.2	157.7	817.7									
41	13.8	81.4	562.9	16.8	102.0	639.1	23.4	146.3	788.9						
39	11.8	68.4	512.9	14.2	84.1	574.6	18.5	113.2	680.8	22.6	140.6	774.2	29.0	185.0	918.1
37	10.5	59.6	475.4	12.5	72.9	530.2	16.1	96.7	621.2	19.0	116.0	691.4	23.0	142.7	786.0
35	9.5	53.1	445.1	11.3	65.0	495.5	14.5	85.7	577.7	16.9	101.3	637.2	20.0	122.1	714.7
33	8.6	47.6	417.8	10.3	58.3	464.3	13.2	76.6	538.8	15.2	89.5	590.6	17.8	106.6	657.0
31	7.8	41.9	386.7	9.3	51.1	428.2	11.7	66.4	493.4	13.4	76.8	537.4	15.5	90.2	592.4
29	7.0	36.6	356.3	8.3	44.6	393.5	10.4	57.3	450.3	11.8	65.8	488.0	13.5	76.5	534.1
27	6.2	32.1	328.2	7.4	39.1	361.7	9.2	49.8	411.8	10.4	56.9	444.7	11.9	65.6	483.9
25	5.6	28.3	301.7	6.6	34.3	331.9	8.2	43.5	376.3	9.3	49.4	405.0	10.5	56.5	438.8
23	5.0	24.9	276.3	5.9	30.1	303.2	7.3	37.9	342.4	8.2	42.8	367.5	9.2	48.7	396.6
21	4.5	21.8	251.4	5.3	26.3	275.3	6.5	32.8	309.9	7.2	37.0	331.6	8.1	41.9	356.9
19	4.0	19.0	227.2	4.7	22.8	248.1	5.7	28.3	278.3	6.3	31.8	297.3	7.1	35.9	319.2
17	3.5	16.4	203.3	4.1	19.6	221.4	5.0	24.2	247.7	5.5	27.1	264.1	6.1	30.5	283.1
15	3.1	14.1	179.7	3.5	16.7	195.0	4.3	20.5	217.6	4.7	22.9	231.8	5.3	25.7	248.0
13	2.6	11.9	156.1	3.0	13.9	168.8	3.6	17.0	188.0	4.0	19.1	200.1	4.4	21.3	213.7
11	2.2	9.8	132.7	2.5	11.4	142.9	3.0	13.9	158.7	3.3	15.5	168.8	3.7	17.3	180.0
9	1.8	7.9	109.2	2.0	9.0	117.0	2.4	10.9	129.8	2.6	12.2	137.8	2.9	13.6	146.7
7	1.4	6.0	85.6	1.5	6.8	91.3	1.8	8.2	101.0	2.0	9.2	107.1	2.2	10.2	113.7
5	1.0	4.3	61.8	1.1	4.7	65.6	1.3	5.7	72.2	1.4	6.3	76.4	1.5	7.0	81.0
3	0.6	2.6	37.7	0.6	2.8	39.7	0.8	3.3	43.4	0.8	3.6	45.8	0.9	4.0	48.5
1	0.2	0.9	12.8	0.2	0.9	13.3	0.2	1.1	14.5	0.3	1.2	15.3	0.3	1.3	16.1

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 10 of 12)

CLIMB PERFORMANCE
TWO ENGINE

WEIGHT 23,000 Lb	ISA -10°C			ISA			ISA +10°C			ISA +15°C			ISA +20°C		
PRESSURE ALTITUDE — 1000 FEET	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb	Time Min.	Dist. N.M.	Fuel Lb
51															
49															
47															
45															
43	18.8	113.8	680.2	27.6	173.0	872.0									
41	14.1	83.5	574.9	17.3	105.2	654.8	24.5	153.5	817.7						
39	12.0	69.8	522.2	14.5	86.0	585.8	19.0	116.2	696.3	23.3	145.3	795.4	30.0	191.5	947.5
37	10.6	60.7	483.3	12.7	74.3	539.5	16.5	98.8	633.5	19.5	118.9	706.6	23.6	147.0	806.0
35	9.6	54.0	452.2	11.5	66.1	503.8	14.8	87.5	588.4	17.2	103.5	649.9	20.5	125.1	730.6
33	8.8	48.4	424.2	10.5	59.3	471.8	13.4	78.0	548.4	15.5	91.4	601.7	18.2	109.0	670.4
31	7.9	42.5	392.5	9.4	51.9	434.9	11.9	67.5	501.7	13.6	78.3	546.9	15.8	92.0	603.6
29	7.1	37.2	361.5	8.4	45.3	399.5	10.6	58.3	457.6	12.0	67.0	496.3	13.7	77.9	543.6
27	6.3	32.6	332.9	7.5	39.7	367.1	9.4	50.6	418.3	10.6	57.9	451.9	12.1	66.7	492.2
25	5.7	28.7	306.0	6.7	34.8	336.7	8.4	44.2	382.1	9.4	50.2	411.5	10.6	57.5	446.0
23	5.1	25.2	280.1	6.0	30.5	307.6	7.4	38.4	347.6	8.3	43.5	373.2	9.4	49.5	403.0
21	4.6	22.1	254.9	5.4	26.6	279.2	6.6	33.3	314.5	7.3	37.6	336.8	8.2	42.5	362.5
19	4.0	19.2	230.3	4.7	23.1	251.6	5.8	28.7	282.5	6.4	32.3	301.8	7.2	36.5	324.2
17	3.6	16.7	206.1	4.1	19.9	224.5	5.0	24.6	251.3	5.6	27.5	268.1	6.2	31.0	287.4
15	3.1	14.3	182.1	3.6	16.9	197.7	4.3	20.8	220.8	4.8	23.3	235.3	5.3	26.1	251.8
13	2.7	12.0	158.3	3.0	14.1	171.2	3.7	17.3	190.7	4.1	19.3	203.0	4.5	21.7	216.9
11	2.2	9.9	134.5	2.5	11.5	144.8	3.0	14.1	161.0	3.4	15.7	171.3	3.7	17.6	182.7
9	1.8	8.0	110.7	2.0	9.1	118.6	2.4	11.1	131.6	2.7	12.4	139.8	3.0	13.8	148.9
7	1.4	6.1	86.7	1.6	6.9	92.5	1.9	8.3	102.4	2.0	9.3	108.6	2.3	10.3	115.4
5	1.0	4.3	62.7	1.1	4.8	66.5	1.3	5.8	73.2	1.4	6.4	77.5	1.6	7.1	82.2
3	0.6	2.6	38.2	0.7	2.8	40.2	0.8	3.3	44.0	0.8	3.7	46.5	0.9	4.1	49.2
1	0.2	0.9	13.0	0.2	0.9	13.5	0.3	1.1	14.7	0.3	1.2	15.5	0.3	1.3	16.3

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 11 of 12)

CLIMB PERFORMANCE
TWO ENGINE

WEIGHT 23,500 Lb	ISA -10°C Time Min.	ISA -10°C Dist. N.M.	ISA -10°C Fuel Lb	ISA Time Min.	ISA Dist. N.M.	ISA Fuel Lb	ISA +10°C Time Min.	ISA +10°C Dist. N.M.	ISA +10°C Fuel Lb	ISA +15°C Time Min.	ISA +15°C Dist. N.M.	ISA +15°C Fuel Lb	ISA +20°C Time Min.	ISA +20°C Dist. N.M.	ISA +20°C Fuel Lb
PRESSURE ALTITUDE — 1000 FEET															
51															
49															
47															
45															
43	21.2	129.4	743.8												
41	14.9	88.1	600.6	18.5	112.3	689.5	27.3	172.6	891.3						
39	12.5	72.7	541.4	15.1	89.9	609.2	20.0	122.7	729.3	24.9	156.0	842.5	33.9	218.4	1043.0
37	11.0	62.9	499.6	13.2	77.3	558.9	17.2	103.3	659.1	20.4	125.0	738.6	25.0	156.2	848.9
35	9.9	55.8	466.6	11.9	68.6	520.9	15.4	91.1	610.6	18.0	108.2	676.6	21.5	131.7	764.1
33	9.1	50.0	437.4	10.8	61.4	487.1	13.9	81.0	568.0	16.1	95.2	624.8	19.0	114.0	698.5
31	8.1	43.8	404.2	9.7	53.6	448.5	12.3	69.9	518.7	14.1	81.2	566.5	16.4	95.8	626.8
29	7.3	38.3	372.1	8.7	46.7	411.7	10.9	60.2	472.5	12.4	69.4	513.2	14.3	80.9	563.1
27	6.5	33.6	342.4	7.8	40.9	378.0	9.7	52.3	431.6	11.0	59.9	466.8	12.5	69.1	509.1
25	5.9	29.5	314.6	6.9	35.9	346.6	8.6	45.6	394.0	9.7	51.9	424.7	11.0	59.4	461.0
23	5.2	25.9	288.0	6.2	31.4	316.5	7.7	39.6	358.3	8.6	44.9	385.0	9.7	51.1	416.2
21	4.7	22.7	262.0	5.5	27.4	287.2	6.8	34.4	324.0	7.6	38.7	347.2	8.5	43.9	374.1
19	4.1	19.8	236.7	4.9	23.8	258.8	5.9	29.6	290.9	6.6	33.3	311.1	7.4	37.6	334.4
17	3.7	17.1	211.7	4.3	20.4	230.8	5.2	25.3	258.7	5.8	28.4	276.2	6.4	32.0	296.4
15	3.2	14.6	187.1	3.7	17.4	203.2	4.5	21.4	227.2	4.9	24.0	242.3	5.5	26.9	259.5
13	2.7	12.4	162.5	3.1	14.5	175.9	3.8	17.8	196.2	4.2	19.9	209.0	4.6	22.3	223.5
11	2.3	10.2	138.1	2.6	11.8	148.8	3.1	14.5	165.6	3.5	16.2	176.3	3.8	18.1	188.1
9	1.9	8.2	113.6	2.1	9.4	121.9	2.5	11.4	135.3	2.8	12.7	143.9	3.1	14.2	153.3
7	1.5	6.3	89.1	1.6	7.1	95.0	1.9	8.6	105.2	2.1	9.5	111.7	2.3	10.6	118.8
5	1.0	4.5	64.3	1.1	4.9	68.3	1.3	5.9	75.2	1.5	6.6	79.7	1.6	7.3	84.6
3	0.6	2.7	39.2	0.7	2.9	41.3	0.8	3.4	45.2	0.9	3.8	47.8	0.9	4.2	50.6
1	0.2	0.9	13.3	0.2	1.0	13.9	0.3	1.1	15.1	0.3	1.2	15.0	0.3	1.3	16.8

CLIMB SPEED: 250 KIAS up to 32,000 feet.
0.70 MI above 32,000 feet.

Figure 8-9
(Sheet 12 of 12)

CRUISE PERFORMANCE

The cruise performance on the following pages is based on flight test data and represents the average delivered aircraft.

NORMAL CRUISE

The Normal Cruise tables (Figure 8-10) provide fuel flows and true airspeed for constant 0.76 MI cruise at weights from 14,000 to 23,000 pounds. Engine power is adjusted to maintain constant Mach as weight decreases. Standard and off-standard day temperatures provide interpolation factors.

MAXIMUM SPECIFIC RANGE

Figure 8-11 presents a graphic description of the range capability at ISA as a function of weight and altitude. The data is based upon two-engine, maximum-range cruise at ISA. In general, the cruise altitude selected should be near the maximum nautical miles per pound fuel for a given aircraft weight.

MAXIMUM-RANGE CRUISE — TWO ENGINES

The Maximum-Range Cruise — Two-Engine tables (Figure 8-12) provide fuel flow, indicated Mach or airspeed, and true airspeed for 100% maximum range cruise at weights from 14,000 to 23,000 pounds. Standard and off-standard day temperatures provide interpolation factors.

LONG-RANGE CRUISE — TWO ENGINES

The Long-Range Cruise — Two-Engine tables (Figure 8-13) provide fuel flow, indicated Mach or airspeed, and true airspeed for 99% maximum range cruise at weights from 14,000 to 23,000 pounds. Standard and off-standard day temperatures provide interpolation factors.

HIGH-SPEED CRUISE

The High Speed Cruise tables (Figure 8-14) provide fuel flows, indicated Mach or airspeed, and true airspeed for a MMO/VMO or VMAX cruise at weights from 14,000 to 23,000 pounds. Power for maximum speed cruise is for the limiting condition (MMO/VMO, or maximum cruise power). Standard and off-standard day temperatures provide interpolation factors.

MAXIMUM RANGE DESCENT — ONE ENGINE

Figure 8-15 shows the descent speed schedule for a maximum range descent to an altitude at or below the single-engine service ceiling for the aircraft gross weight.

LONG-RANGE CRUISE — ONE ENGINE

The Long-Range Cruise — One Engine tables (Figure 8-16) provide fuel flows, indicated Mach or airspeed and true airspeed for 99% maximum range cruise at weights from 14,000 to 23,000 pounds. Standard and off-standard day temperatures provide interpolation factors.

NORMAL CRUISE

WEIGHT - 14,000 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS Fuel-Lb/Hr	425 878				
49	KTAS Fuel-Lb/Hr	425 860	435 885			
47	KTAS Fuel-Lb/Hr	425 862	435 887	445 910		
45	KTAS Fuel-Lb/Hr	425 881	435 907	445 931	450 942	454 954
43	KTAS Fuel-Lb/Hr	425 912	435 937	445 961	450 974	455 986
41	KTAS Fuel-Lb/Hr	425 953	435 978	445 1004	450 1018	455 1031
39	KTAS Fuel-Lb/Hr	425 1005	435 1031	445 1058	450 1071	455 1086
37	KTAS Fuel-Lb/Hr	425 1069	435 1096	445 1126	450 1138	455 1154
35	KTAS Fuel-Lb/Hr	427 1152	437 1187	447 1215	452 1230	457 1248
30	KTAS Fuel-Lb/Hr	437 1452	447 1484	456 1526	461 1545	466 1563
25	KTAS Fuel-Lb/Hr	447 1830	456 1883	466 1930	470 1946	475 1969

WEIGHT - 14,500 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS Fuel-Lb/Hr					
49	KTAS Fuel-Lb/Hr	425 889	435 914			
47	KTAS Fuel-Lb/Hr	425 886	435 912	445 935		
45	KTAS Fuel-Lb/Hr	425 900	435 927	445 951	450 962	
43	KTAS Fuel-Lb/Hr	425 927	435 954	445 979	450 991	455 1003
41	KTAS Fuel-Lb/Hr	425 966	435 993	445 1018	450 1033	455 1046
39	KTAS Fuel-Lb/Hr	425 1017	435 1044	445 1071	450 1085	455 1100
37	KTAS Fuel-Lb/Hr	425 1078	435 1107	445 1136	450 1149	455 1166
35	KTAS Fuel-Lb/Hr	427 1161	437 1196	447 1224	452 1240	457 1258
30	KTAS Fuel-Lb/Hr	437 1456	447 1487	456 1530	461 1550	466 1567
25	KTAS Fuel-Lb/Hr	447 1831	456 1885	466 1931	470 1948	475 1970

Figure 8-10
(Sheet 1 of 10)

NORMAL CRUISE

WEIGHT - 15,000 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS					
	Fuel-Lb/Hr					
49	KTAS	425	435			
	Fuel-Lb/Hr	920	946			
47	KTAS	425	435			
	Fuel-Lb/Hr	911	938			
45	KTAS	425	435	445	450	
	Fuel-Lb/Hr	921	947	972	985	
43	KTAS	425	435	445	450	454
	Fuel-Lb/Hr	945	972	998	1010	1023
41	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	981	1009	1034	1049	1062
39	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1030	1058	1085	1100	1114
37	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1090	1119	1148	1162	1179
35	KTAS	427	437	447	452	457
	Fuel-Lb/Hr	1169	1206	1233	1250	1268
30	KTAS	437	447	456	461	466
	Fuel-Lb/Hr	1460	1491	1534	1554	1571
25	KTAS	447	456	466	470	475
	Fuel-Lb/Hr	1833	1886	1933	1949	1972

WEIGHT - 15,500 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS					
	Fuel-Lb/Hr					
49	KTAS	425				
	Fuel-Lb/Hr	956				
47	KTAS	425	435			
	Fuel-Lb/Hr	939	965			
45	KTAS	425	435	445		
	Fuel-Lb/Hr	945	970	995		
43	KTAS	425	435	445	450	454
	Fuel-Lb/Hr	962	991	1018	1029	1043
41	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	995	1024	1051	1065	1078
39	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1043	1073	1099	1115	1129
37	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1101	1132	1161	1176	1192
35	KTAS	427	437	447	452	457
	Fuel-Lb/Hr	1179	1216	1243	1261	1279
30	KTAS	437	447	456	461	466
	Fuel-Lb/Hr	1464	1495	1538	1558	1576
25	KTAS	447	456	466	470	475
	Fuel-Lb/Hr	1834	1887	1934	1951	1973

Figure 8-10
(Sheet 2 of 10)

NORMAL CRUISE

WEIGHT - 16,000 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS					
	Fuel-Lb/Hr					
49	KTAS	425				
	Fuel-Lb/Hr	996				
47	KTAS	425	435			
	Fuel-Lb/Hr	967	994			
45	KTAS	425	435	445		
	Fuel-Lb/Hr	969	995	1020		
43	KTAS	425	435	445	450	454
	Fuel-Lb/Hr	982	1011	1039	1050	1064
41	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1011	1041	1069	1082	1095
39	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1056	1087	1115	1130	1145
37	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1114	1146	1174	1190	1206
35	KTAS	427	437	447	452	457
	Fuel-Lb/Hr	1191	1227	1255	1273	1290
30	KTAS	437	447	456	461	466
	Fuel-Lb/Hr	1468	1499	1543	1563	1580
25	KTAS	447	456	466	470	475
	Fuel-Lb/Hr	1835	1889	1935	1952	1975

WEIGHT - 16,500 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS					
	Fuel-Lb/Hr					
49	KTAS					
	Fuel-Lb/Hr					
47	KTAS	425	435			
	Fuel-Lb/Hr	997	1026			
45	KTAS	425	435	445		
	Fuel-Lb/Hr	993	1021	1048		
43	KTAS	425	435	445	450	454
	Fuel-Lb/Hr	1004	1031	1059	1071	1085
41	KTAS	425	435	445	450	454
	Fuel-Lb/Hr	1027	1059	1088	1100	1114
39	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1070	1103	1131	1146	1160
37	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1126	1160	1188	1204	1221
35	KTAS	427	437	447	452	457
	Fuel-Lb/Hr	1204	1239	1268	1286	1303
30	KTAS	437	447	456	461	466
	Fuel-Lb/Hr	1472	1503	1548	1567	1585
25	KTAS	447	456	466	470	475
	Fuel-Lb/Hr	1837	1891	1937	1954	1977

Figure 8-10
(Sheet 3 of 10)

NORMAL CRUISE

WEIGHT - 17,000 LB
Mach - 0.76 Mı

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS					
	Fuel-Lb/Hr					
49	KTAS					
	Fuel-Lb/Hr					
47	KTAS	425				
	Fuel-Lb/Hr	1033				
45	KTAS	425	435			
	Fuel-Lb/Hr	1020	1048			
43	KTAS	425	435	445	450	
	Fuel-Lb/Hr	1027	1052	1081	1094	
41	KTAS	425	435	445	450	454
	Fuel-Lb/Hr	1046	1078	1108	1119	1134
39	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1085	1118	1148	1162	1177
37	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1139	1174	1203	1219	1236
35	KTAS	427	437	447	452	457
	Fuel-Lb/Hr	1217	1252	1282	1299	1317
30	KTAS	437	447	456	461	466
	Fuel-Lb/Hr	1479	1510	1555	1575	1592
25	KTAS	447	456	466	470	475
	Fuel-Lb/Hr	1839	1893	1940	1956	1980

WEIGHT - 17,500 LB
Mach - 0.76 Mı

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS					
	Fuel-Lb/Hr					
49	KTAS					
	Fuel-Lb/Hr					
47	KTAS	425				
	Fuel-Lb/Hr	1071				
45	KTAS	425	435			
	Fuel-Lb/Hr	1047	1077			
43	KTAS	425	435	445	450	
	Fuel-Lb/Hr	1050	1076	1105	1119	
41	KTAS	425	435	445	450	454
	Fuel-Lb/Hr	1068	1097	1129	1139	1155
39	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1100	1134	1165	1179	1193
37	KTAS	425	435	445	450	455
	Fuel-Lb/Hr	1153	1188	1218	1234	1251
35	KTAS	427	437	447	452	457
	Fuel-Lb/Hr	1231	1265	1296	1313	1330
30	KTAS	437	447	456	461	466
	Fuel-Lb/Hr	1488	1519	1565	1584	1601
25	KTAS	447	456	466	470	475
	Fuel-Lb/Hr	1843	1897	1944	1960	1984

Figure 8-10
(Sheet 4 of 10)

NORMAL CRUISE

WEIGHT - 18,000 LB Mach - 0.76 MI		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
ALTITUDE — 1000 FEET 51	KTAS Fuel-Lb/Hr					
49	KTAS Fuel-Lb/Hr					
47	KTAS Fuel-Lb/Hr	425 1114				
45	KTAS Fuel-Lb/Hr	425 1076	435 1106			
43	KTAS Fuel-Lb/Hr	425 1074	435 1102	445 1130		
41	KTAS Fuel-Lb/Hr	425 1090	435 1117	445 1150	450 1161	454 1176
39	KTAS Fuel-Lb/Hr	425 1120	435 1152	445 1184	450 1197	454 1212
37	KTAS Fuel-Lb/Hr	425 1169	435 1203	445 1235	450 1250	455 1266
35	KTAS Fuel-Lb/Hr	427 1245	437 1278	447 1311	452 1327	457 1345
30	KTAS Fuel-Lb/Hr	437 1498	447 1528	456 1575	461 1594	466 1611
25	KTAS Fuel-Lb/Hr	447 1846	456 1902	466 1948	470 1964	475 1988

WEIGHT - 18,500 LB Mach - 0.76 MI		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
ALTITUDE — 1000 FEET 51	KTAS Fuel-Lb/Hr					
49	KTAS Fuel-Lb/Hr					
47	KTAS Fuel-Lb/Hr					
45	KTAS Fuel-Lb/Hr	425 1111	435 1143			
43	KTAS Fuel-Lb/Hr	425 1100	435 1129	445 1157		
41	KTAS Fuel-Lb/Hr	425 1112	435 1137	445 1171	450 1183	454 1198
39	KTAS Fuel-Lb/Hr	425 1140	435 1170	445 1204	450 1216	454 1231
37	KTAS Fuel-Lb/Hr	425 1185	435 1218	445 1251	450 1266	455 1282
35	KTAS Fuel-Lb/Hr	427 1260	437 1292	447 1326	452 1342	457 1359
30	KTAS Fuel-Lb/Hr	437 1508	447 1538	456 1585	461 1605	466 1621
25	KTAS Fuel-Lb/Hr	447 1850	456 1906	466 1952	470 1968	475 1992

Figure 8-10
(Sheet 5 of 10)

NORMAL CRUISE

WEIGHT - 19,000 LB
Mach - 0.76 Mı

ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS Fuel-Lb/Hr					
49	KTAS Fuel-Lb/Hr					
47	KTAS Fuel-Lb/Hr					
45	KTAS Fuel-Lb/Hr	425 1148	435 1180			
43	KTAS Fuel-Lb/Hr	425 1126	435 1157	445 1187		
41	KTAS Fuel-Lb/Hr	425 1134	435 1161	445 1192	450 1206	
39	KTAS Fuel-Lb/Hr	425 1160	435 1189	445 1224	450 1235	454 1252
37	KTAS Fuel-Lb/Hr	425 1202	435 1234	445 1268	450 1282	455 1298
35	KTAS Fuel-Lb/Hr	427 1275	437 1306	447 1341	452 1357	457 1374
30	KTAS Fuel-Lb/Hr	437 1517	447 1549	456 1596	461 1615	466 1632
25	KTAS Fuel-Lb/Hr	447 1854	456 1910	466 1956	470 1972	475 1997

WEIGHT - 19,500 LB
Mach - 0.76 Mı

ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS Fuel-Lb/Hr					
49	KTAS Fuel-Lb/Hr					
47	KTAS Fuel-Lb/Hr					
45	KTAS Fuel-Lb/Hr	425 1187				
43	KTAS Fuel-Lb/Hr	425 1153	435 1186			
41	KTAS Fuel-Lb/Hr	425 1158	435 1186	445 1216	450 1232	
39	KTAS Fuel-Lb/Hr	425 1181	435 1208	445 1244	450 1255	454 1273
37	KTAS Fuel-Lb/Hr	425 1220	435 1250	445 1286	450 1299	454 1316
35	KTAS Fuel-Lb/Hr	427 1290	437 1320	447 1357	452 1372	457 1389
30	KTAS Fuel-Lb/Hr	437 1528	447 1560	456 1606	461 1626	466 1642
25	KTAS Fuel-Lb/Hr	447 1858	456 1914	466 1960	470 1976	475 2001

Figure 8-10
(Sheet 6 of 10)

NORMAL CRUISE

WEIGHT - 20,000 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS					
	Fuel-Lb/Hr					
49	KTAS					
	Fuel-Lb/Hr					
47	KTAS					
	Fuel-Lb/Hr					
45	KTAS	425				
	Fuel-Lb/Hr	1235				
43	KTAS	425	435			
	Fuel-Lb/Hr	1184	1217			
41	KTAS	425	435	445	450	
	Fuel-Lb/Hr	1182	1211	1243	1259	
39	KTAS	425	435	445	450	454
	Fuel-Lb/Hr	1203	1228	1265	1277	1294
37	KTAS	425	435	445	450	454
	Fuel-Lb/Hr	1239	1268	1305	1318	1334
35	KTAS	427	437	447	452	457
	Fuel-Lb/Hr	1306	1335	1373	1388	1405
30	KTAS	437	447	456	461	466
	Fuel-Lb/Hr	1538	1571	1617	1637	1653
25	KTAS	447	456	466	470	475
	Fuel-Lb/Hr	1862	1919	1965	1981	2006

WEIGHT - 20,500 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS					
	Fuel-Lb/Hr					
49	KTAS					
	Fuel-Lb/Hr					
47	KTAS					
	Fuel-Lb/Hr					
45	KTAS					
	Fuel-Lb/Hr					
43	KTAS	425	435			
	Fuel-Lb/Hr	1220	1253			
41	KTAS	425	435	445		
	Fuel-Lb/Hr	1207	1239	1271		
39	KTAS	425	435	445	450	454
	Fuel-Lb/Hr	1224	1250	1286	1300	1316
37	KTAS	425	435	445	450	454
	Fuel-Lb/Hr	1258	1286	1324	1337	1354
35	KTAS	427	437	447	452	457
	Fuel-Lb/Hr	1322	1350	1389	1404	1420
30	KTAS	437	447	456	461	466
	Fuel-Lb/Hr	1550	1584	1630	1649	1665
25	KTAS	447	456	466	471	475
	Fuel-Lb/Hr	1866	1924	1969	1985	2011

Figure 8-10
(Sheet 7 of 10)

NORMAL CRUISE

WEIGHT - 21,000 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS Fuel-Lb/Hr					
49	KTAS Fuel-Lb/Hr					
47	KTAS Fuel-Lb/Hr					
45	KTAS Fuel-Lb/Hr					
43	KTAS Fuel-Lb/Hr	425 1257	435 1292			
41	KTAS Fuel-Lb/Hr	425 1233	435 1267	445 1299		
39	KTAS Fuel-Lb/Hr	425 1246	435 1274	445 1308	450 1324	
37	KTAS Fuel-Lb/Hr	425 1278	435 1304	445 1344	450 1356	454 1375
35	KTAS Fuel-Lb/Hr	427 1338	437 1365	447 1406	452 1420	457 1437
30	KTAS Fuel-Lb/Hr	437 1562	447 1597	457 1643	461 1663	466 1678
25	KTAS Fuel-Lb/Hr	447 1871	456 1929	466 1975	471 1991	475 2017

WEIGHT - 21,500 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS Fuel-Lb/Hr					
49	KTAS Fuel-Lb/Hr					
47	KTAS Fuel-Lb/Hr					
45	KTAS Fuel-Lb/Hr					
43	KTAS Fuel-Lb/Hr	425 1295	435 1332			
41	KTAS Fuel-Lb/Hr	425 1260	435 1296	445 1329		
39	KTAS Fuel-Lb/Hr	425 1269	435 1299	445 1331	450 1348	
37	KTAS Fuel-Lb/Hr	425 1299	435 1323	445 1365	450 1376	454 1396
35	KTAS Fuel-Lb/Hr	427 1356	437 1382	447 1424	452 1438	457 1455
30	KTAS Fuel-Lb/Hr	437 1575	447 1611	457 1657	461 1676	466 1692
25	KTAS Fuel-Lb/Hr	447 1881	456 1939	466 1984	471 2000	475 2027

Figure 8-10
(Sheet 8 of 10)

NORMAL CRUISE

WEIGHT - 22,000 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS Fuel-Lb/Hr					
49	KTAS Fuel-Lb/Hr					
47	KTAS Fuel-Lb/Hr					
45	KTAS Fuel-Lb/Hr					
43	KTAS Fuel-Lb/Hr	425 1341				
41	KTAS Fuel-Lb/Hr	425 1291	435 1327			
39	KTAS Fuel-Lb/Hr	425 1292	435 1325	445 1358	450 1375	
37	KTAS Fuel-Lb/Hr	425 1319	435 1346	445 1385	450 1398	454 1417
35	KTAS Fuel-Lb/Hr	427 1374	437 1399	447 1443	452 1456	457 1475
30	KTAS Fuel-Lb/Hr	437 1588	447 1625	457 1670	461 1690	466 1707
25	KTAS Fuel-Lb/Hr	447 1891	456 1949	466 1994	471 2011	475 2037

WEIGHT - 22,500 LB
Mach - 0.76 MI

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	KTAS Fuel-Lb/Hr					
49	KTAS Fuel-Lb/Hr					
47	KTAS Fuel-Lb/Hr					
45	KTAS Fuel-Lb/Hr					
43	KTAS Fuel-Lb/Hr	425 1392				
41	KTAS Fuel-Lb/Hr	425 1327	435 1363			
39	KTAS Fuel-Lb/Hr	425 1317	435 1352	445 1386	450 1404	
37	KTAS Fuel-Lb/Hr	425 1340	435 1369	445 1406	450 1422	454 1439
35	KTAS Fuel-Lb/Hr	427 1393	437 1420	447 1462	452 1475	457 1495
30	KTAS Fuel-Lb/Hr	437 1601	447 1640	457 1685	461 1704	466 1722
25	KTAS Fuel-Lb/Hr	447 1901	456 1959	466 2004	471 2021	475 2047

Figure 8-10
(Sheet 9 of 10)

NORMAL CRUISE

WEIGHT - 23,000 LB Mach - 0.76 MI			TEMPERATURE — °C				
			ISA -10	ISA	ISA +10	ISA +15	ISA +20
ALTITUDE — 1000 FEET	51	KTAS Fuel-Lb/Hr					
	49	KTAS Fuel-Lb/Hr					
	47	KTAS Fuel-Lb/Hr					
	45	KTAS Fuel-Lb/Hr					
	43	KTAS Fuel-Lb/Hr					
	41	KTAS Fuel-Lb/Hr	425 1364	435 1400			
	39	KTAS Fuel-Lb/Hr	425 1343	435 1380	445 1414		
	37	KTAS Fuel-Lb/Hr	425 1361	435 1393	445 1427	450 1445	455 1463
	35	KTAS Fuel-Lb/Hr	427 1412	437 1442	447 1481	452 1494	457 1515
	30	KTAS Fuel-Lb/Hr	437 1614	447 1655	457 1699	461 1718	466 1737
	25	KTAS Fuel-Lb/Hr	447 1911	456 1969	466 2013	471 2032	475 2058

Figure 8-10
(Sheet 10 of 10)

MAXIMUM SPECIFIC RANGE

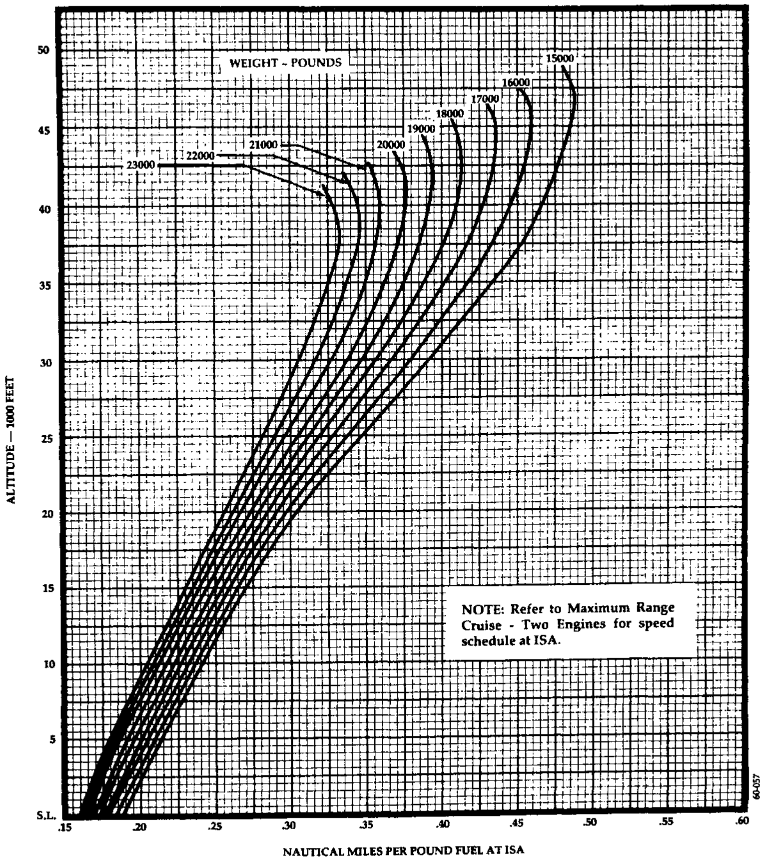

Figure 8-11

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 14,000 LB			TEMPERATURE — °C				
			ISA -10	ISA	ISA +10	ISA +15	ISA +20
ALTITUDE — 1000 FEET	51	Mach Ind.	.733				
		KTAS	409				
		Fuel - Lb/Hr	820				
	49	Mach Ind.	.708	.711	.713		
		KTAS	395	406	417		
		Fuel - Lb/Hr	763	790	814		
	47	Mach Ind.	.703	.704	.704	.704	.704
		KTAS	392	402	411	415	420
		Fuel - Lb/Hr	751	776	796	805	816
	45	Mach Ind.	.687	.673	.675	.671	.682
		KTAS	383	384	394	396	407
		Fuel - Lb/Hr	743	750	772	779	800
	43	Mach Ind.	.677	.654	.654	.654	.654
		KTAS	377	373	382	386	390
		Fuel - Lb/Hr	746	740	759	769	778
	41	Mach Ind.	.666	.633	.641	.635	.634
		KTAS	371	361	374	374	378
		Fuel - Lb/Hr	750	730	758	760	770
	39	Mach Ind.	.642	.607	.611	.616	.607
		KTAS	357	346	356	363	362
		Fuel - Lb/Hr	740	716	740	754	753
	37	Mach Ind.	.606	.601	.604	.604	.598
		KTAS	337	342	352	356	356
		Fuel - Lb/Hr	713	729	753	761	762
	35	Mach Ind.	.579	.573	.585	.585	.585
		KTAS	324	328	342	346	350
		Fuel - Lb/Hr	713	728	763	772	780
	30	Mach Ind.	.506	.504	.510	.516	.521
		KTAS	289	295	305	311	317
		Fuel - Lb/Hr	705	724	755	774	790
	25	KIAS	191	191	191	191	191
		KTAS	273	279	284	287	290
		Fuel - Lb/Hr	753	776	801	810	818
	20	KIAS	190	191	195	196	195
		KTAS	250	256	267	271	272
		Fuel - Lb/Hr	791	821	856	865	866
	15	KIAS	200	204	199	197	195
		KTAS	243	253	251	251	251
		Fuel - Lb/Hr	888	921	909	906	906
	10	KIAS	207	203	198	195	192
		KTAS	233	232	231	229	228
		Fuel - Lb/Hr	960	948	941	938	938
	5	KIAS	204	198	194	192	191
		KTAS	213	211	210	210	211
		Fuel - Lb/Hr	972	965	972	979	990
	S.L.	KIAS	202	199	196	195	194
		KTAS	196	197	198	198	199
		Fuel - Lb/Hr	1016	1028	1041	1052	1066

Figure 8-12
(Sheet 1 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 14,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.	.732				
	KTAS	409				
	Fuel - Lb/Hr	856				
49	Mach Ind.	.720	.720			
	KTAS	402	411			
	Fuel - Lb/Hr	808	830			
47	Mach Ind.	.704	.704	.704	.704	
	KTAS	392	402	411	415	
	Fuel - Lb/Hr	776	799	819	828	
45	Mach Ind.	.675	.687	.687	.688	.688
	KTAS	376	392	401	406	410
	Fuel - Lb/Hr	751	785	808	820	829
43	Mach Ind.	.662	.657	.658	.659	.658
	KTAS	369	375	384	389	393
	Fuel - Lb/Hr	747	763	783	795	804
41	Mach Ind.	.654	.642	.644	.643	.644
	KTAS	364	366	376	379	384
	Fuel - Lb/Hr	750	759	779	788	800
39	Mach Ind.	.631	.617	.621	.618	.617
	KTAS	351	352	362	364	368
	Fuel - Lb/Hr	740	745	770	774	783
37	Mach Ind.	.604	.604	.604	.604	.604
	KTAS	336	344	352	356	360
	Fuel - Lb/Hr	725	749	768	776	786
35	Mach Ind.	.593	.583	.596	.596	.581
	KTAS	332	334	349	352	347
	Fuel - Lb/Hr	744	756	792	800	789
30	Mach Ind.	.518	.514	.522	.527	.531
	KTAS	296	300	312	318	324
	Fuel - Lb/Hr	736	752	786	803	819
25	KIAS	195	194	195	195	195
	KTAS	278	283	289	292	295
	Fuel - Lb/Hr	775	802	827	836	843
20	KIAS	194	194	198	198	197
	KTAS	255	260	271	274	274
	Fuel - Lb/Hr	815	844	877	884	883
15	KIAS	205	206	201	199	197
	KTAS	249	255	253	253	253
	Fuel - Lb/Hr	921	937	928	925	925
10	KIAS	209	205	200	196	194
	KTAS	235	235	233	232	230
	Fuel - Lb/Hr	976	967	960	959	959
5	KIAS	206	200	196	194	193
	KTAS	215	213	212	212	213
	Fuel - Lb/Hr	989	985	994	1003	1015
S.L.	KIAS	204	202	198	197	196
	KTAS	198	200	200	200	201
	Fuel - Lb/Hr	1037	1052	1065	1077	1091

Figure 8-12
(Sheet 2 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 15,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.	.731	.723			
	KTAS	408	413			
	Fuel - Lb/Hr	855	868			
47	Mach Ind.	.706	.708	.704		
	KTAS	394	404	411		
	Fuel - Lb/Hr	803	828	844		
45	Mach Ind.	.695	.694	.694	.695	.695
	KTAS	388	396	405	410	415
	Fuel - Lb/Hr	795	816	837	850	859
43	Mach Ind.	.663	.668	.667	.669	.669
	KTAS	369	381	389	395	399
	Fuel - Lb/Hr	767	795	814	828	837
41	Mach Ind.	.648	.650	.651	.651	.654
	KTAS	361	371	380	384	390
	Fuel - Lb/Hr	761	787	807	817	832
39	Mach Ind.	.632	.626	.634	.626	.626
	KTAS	352	357	370	369	373
	Fuel - Lb/Hr	757	774	802	803	814
37	Mach Ind.	.604	.604	.604	.604	.604
	KTAS	336	344	352	356	360
	Fuel - Lb/Hr	740	765	784	791	803
35	Mach Ind.	.596	.594	.604	.604	.591
	KTAS	333	340	354	358	354
	Fuel - Lb/Hr	761	784	817	825	819
30	Mach Ind.	.529	.525	.533	.537	.540
	KTAS	303	307	319	324	329
	Fuel - Lb/Hr	766	783	818	833	846
25	KIAS	197	198	198	198	198
	KTAS	281	288	294	297	300
	Fuel - Lb/Hr	797	829	853	862	869
20	KIAS	197	197	200	200	198
	KTAS	259	265	274	276	277
	Fuel - Lb/Hr	841	868	897	903	902
15	KIAS	208	208	205	201	199
	KTAS	252	258	258	256	256
	Fuel - Lb/Hr	941	956	956	944	945
10	KIAS	210	207	201	198	196
	KTAS	237	237	235	234	233
	Fuel - Lb/Hr	993	987	980	980	984
5	KIAS	207	202	198	197	195
	KTAS	217	215	214	215	215
	Fuel - Lb/Hr	1008	1005	1018	1028	1039
S.L.	KIAS	206	204	200	199	198
	KTAS	200	202	202	202	203
	Fuel - Lb/Hr	1060	1074	1088	1101	1115

Figure 8-12
(Sheet 3 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 15,500 LB

ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
49	Mach Ind.	.733	.723			
	KTAS	409	413			
	Fuel – Lb/Hr	891	904			
47	Mach Ind.	.710	.710	.711		
	KTAS	396	405	415		
	Fuel – Lb/Hr	833	858	883		
45	Mach Ind.	.703	.703	.703	.703	.703
	KTAS	392	402	411	415	420
	Fuel – Lb/Hr	827	851	873	882	892
43	Mach Ind.	.673	.682	.683	.672	.682
	KTAS	375	389	399	397	407
	Fuel – Lb/Hr	800	832	855	853	876
41	Mach Ind.	.654	.654	.654	.654	.655
	KTAS	364	373	382	386	390
	Fuel – Lb/Hr	786	810	829	841	852
39	Mach Ind.	.633	.635	.635	.634	.636
	KTAS	353	362	370	374	379
	Fuel – Lb/Hr	776	803	821	832	845
37	Mach Ind.	.608	.610	.613	.607	.609
	KTAS	338	348	357	358	363
	Fuel – Lb/Hr	760	789	812	813	829
35	Mach Ind.	.601	.604	.604	.601	.601
	KTAS	336	346	354	356	360
	Fuel – Lb/Hr	783	812	832	836	849
30	Mach Ind.	.531	.536	.545	.547	.542
	KTAS	304	314	325	330	330
	Fuel – Lb/Hr	783	814	848	862	863
25	KIAS	200	201	201	201	201
	KTAS	286	293	299	302	305
	Fuel – Lb/Hr	824	856	879	888	895
20	KIAS	200	201	203	202	201
	KTAS	263	269	277	279	280
	Fuel – Lb/Hr	867	893	918	922	923
15	KIAS	210	210	206	203	201
	KTAS	255	260	260	258	258
	Fuel – Lb/Hr	960	972	973	965	965
10	KIAS	212	209	203	200	199
	KTAS	239	239	237	236	237
	Fuel – Lb/Hr	1011	1006	1000	1001	1014
5	KIAS	210	204	200	199	199
	KTAS	219	217	217	217	219
	Fuel – Lb/Hr	1029	1026	1041	1053	1071
S.L.	KIAS	207	206	202	201	200
	KTAS	202	204	204	205	205
	Fuel – Lb/Hr	1079	1096	1113	1127	1142

Figure 8-12
(Sheet 4 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 16,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.	.726				
	KTAS	405				
	Fuel - Lb/Hr	919				
47	Mach Ind.	.720	.720	.721		
	KTAS	402	412	421		
	Fuel - Lb/Hr	877	903	927		
45	Mach Ind.	.704	.704	.704	.703	.703
	KTAS	392	402	411	415	420
	Fuel - Lb/Hr	849	874	898	905	916
43	Mach Ind.	.689	.685	.688	.689	.689
	KTAS	384	391	401	407	411
	Fuel - Lb/Hr	839	857	882	896	906
41	Mach Ind.	.655	.659	.657	.657	.658
	KTAS	365	376	384	387	392
	Fuel - Lb/Hr	807	835	853	865	877
39	Mach Ind.	.641	.643	.643	.642	.645
	KTAS	357	367	375	378	384
	Fuel - Lb/Hr	804	832	849	861	876
37	Mach Ind.	.616	.619	.624	.616	.618
	KTAS	343	353	364	363	368
	Fuel - Lb/Hr	788	818	842	843	859
35	Mach Ind.	.604	.604	.604	.604	.604
	KTAS	338	346	354	358	361
	Fuel - Lb/Hr	802	828	847	856	870
30	Mach Ind.	.540	.547	.556	.557	.546
	KTAS	309	320	332	336	333
	Fuel - Lb/Hr	812	844	880	891	884
25	KIAS	204	204	205	205	205
	KTAS	290	298	304	307	310
	Fuel - Lb/Hr	851	882	905	914	921
20	KIAS	204	204	205	204	204
	KTAS	268	273	280	282	284
	Fuel - Lb/Hr	893	918	939	941	948
15	KIAS	212	211	208	204	203
	KTAS	257	262	262	260	261
	Fuel - Lb/Hr	978	989	990	983	987
10	KIAS	215	210	205	202	202
	KTAS	241	241	239	239	241
	Fuel - Lb/Hr	1032	1025	1020	1025	1043
5	KIAS	211	205	202	202	202
	KTAS	221	218	219	221	222
	Fuel - Lb/Hr	1047	1047	1064	1083	1102
S.L.	KIAS	209	208	205	204	203
	KTAS	204	206	206	207	207
	Fuel - Lb/Hr	1101	1118	1137	1152	1168

Figure 8-12
(Sheet 5 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 16,500 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.	.732				
	KTAS	409				
	Fuel - Lb/Hr	967				
47	Mach Ind.	.723	.723			
	KTAS	404	413			
	Fuel - Lb/Hr	914	940			
45	Mach Ind.	.711	.710	.711	.704	
	KTAS	397	406	415	415	
	Fuel - Lb/Hr	882	907	932	931	
43	Mach Ind.	.695	.695	.692	.695	.695
	KTAS	387	397	404	410	415
	Fuel - Lb/Hr	866	891	909	925	935
41	Mach Ind.	.667	.671	.666	.666	.668
	KTAS	372	383	389	393	398
	Fuel - Lb/Hr	842	870	885	897	911
39	Mach Ind.	.649	.652	.649	.649	.654
	KTAS	361	372	379	383	390
	Fuel - Lb/Hr	832	860	877	890	907
37	Mach Ind.	.623	.627	.625	.624	.627
	KTAS	347	358	364	368	374
	Fuel - Lb/Hr	814	847	861	873	890
35	Mach Ind.	.604	.604	.605	.604	.604
	KTAS	338	346	354	358	361
	Fuel - Lb/Hr	817	844	862	873	887
30	Mach Ind.	.550	.557	.566	.556	.555
	KTAS	315	326	338	336	339
	Fuel - Lb/Hr	840	874	909	903	915
25	KIAS	207	207	208	208	207
	KTAS	295	301	309	312	313
	Fuel - Lb/Hr	877	905	932	940	943
20	KIAS	207	207	207	207	207
	KTAS	272	277	283	286	288
	Fuel - Lb/Hr	918	943	960	966	975
15	KIAS	214	213	209	206	206
	KTAS	260	264	264	263	265
	Fuel - Lb/Hr	998	1007	1007	1002	1015
10	KIAS	217	212	207	205	205
	KTAS	244	243	241	242	244
	Fuel - Lb/Hr	1050	1043	1040	1053	1074
5	KIAS	213	207	205	205	205
	KTAS	223	221	222	224	226
	Fuel - Lb/Hr	1067	1068	1094	1114	1135
S.L.	KIAS	211	209	206	206	205
	KTAS	205	207	208	209	210
	Fuel - Lb/Hr	1121	1141	1161	1178	1195

Figure 8-12
(Sheet 6 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 17,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.	.723	.723			
	KTAS	404	413			
	Fuel - Lb/Hr	948	975			
45	Mach Ind.	.708	.708	.711	.709	
	KTAS	395	404	415	419	
	Fuel - Lb/Hr	904	929	959	968	
43	Mach Ind.	.704	.704	.700	.704	.704
	KTAS	392	402	409	415	420
	Fuel - Lb/Hr	897	924	943	958	969
41	Mach Ind.	.682	.672	.674	.669	.681
	KTAS	380	383	394	395	406
	Fuel - Lb/Hr	880	890	917	923	951
39	Mach Ind.	.654	.654	.654	.654	.654
	KTAS	364	373	381	386	390
	Fuel - Lb/Hr	856	881	902	915	926
37	Mach Ind.	.630	.636	.631	.632	.635
	KTAS	351	363	368	372	379
	Fuel - Lb/Hr	841	876	888	903	920
35	Mach Ind.	.607	.611	.607	.607	.610
	KTAS	340	350	356	359	365
	Fuel - Lb/Hr	838	871	882	895	914
30	Mach Ind.	.559	.568	.574	.558	.564
	KTAS	320	332	343	337	344
	Fuel - Lb/Hr	869	905	936	922	945
25	KIAS	207	209	211	211	207
	KTAS	295	303	313	316	314
	Fuel - Lb/Hr	891	925	959	967	959
20	KIAS	210	210	210	210	210
	KTAS	276	282	287	290	293
	Fuel - Lb/Hr	944	969	985	991	1001
15	KIAS	216	215	211	209	209
	KTAS	262	266	266	267	269
	Fuel - Lb/Hr	1017	1024	1025	1029	1043
10	KIAS	219	214	209	209	209
	KTAS	246	245	244	246	248
	Fuel - Lb/Hr	1069	1063	1063	1082	1105
5	KIAS	215	209	208	208	208
	KTAS	224	222	225	227	229
	Fuel - Lb/Hr	1086	1090	1124	1145	1167
S.L.	KIAS	213	211	208	208	208
	KTAS	207	209	210	211	213
	Fuel - Lb/Hr	1142	1163	1186	1204	1227

Figure 8-12
(Sheet 7 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 17,500 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.	.723	.723			
	KTAS	404	414			
	Fuel - Lb/Hr	984	1011			
45	Mach Ind.	.718	.718	.718		
	KTAS	401	410	420		
	Fuel - Lb/Hr	947	974	1000		
43	Mach Ind.	.704	.704	.703	.704	.703
	KTAS	392	402	411	415	420
	Fuel - Lb/Hr	919	947	972	981	993
41	Mach Ind.	.689	.685	.686	.687	.688
	KTAS	384	391	401	405	410
	Fuel - Lb/Hr	909	930	954	969	981
39	Mach Ind.	.654	.661	.654	.654	.654
	KTAS	364	377	382	386	390
	Fuel - Lb/Hr	875	910	922	935	947
37	Mach Ind.	.637	.644	.638	.639	.644
	KTAS	355	367	372	377	384
	Fuel - Lb/Hr	869	905	917	932	950
35	Mach Ind.	.614	.620	.614	.614	.618
	KTAS	344	355	360	364	370
	Fuel - Lb/Hr	865	900	910	925	943
30	Mach Ind.	.568	.578	.571	.567	.573
	KTAS	325	338	341	342	350
	Fuel - Lb/Hr	897	935	945	952	975
25	KIAS	207	212	214	212	210
	KTAS	295	309	318	318	319
	Fuel - Lb/Hr	907	954	985	984	989
20	KIAS	213	213	213	213	213
	KTAS	280	286	291	294	297
	Fuel - Lb/Hr	970	993	1010	1018	1028
15	KIAS	218	216	212	212	212
	KTAS	265	268	268	270	273
	Fuel - Lb/Hr	1036	1043	1045	1056	1071
10	KIAS	220	216	212	212	212
	KTAS	248	247	247	249	251
	Fuel - Lb/Hr	1087	1082	1092	1111	1135
5	KIAS	217	211	211	211	211
	KTAS	226	225	229	231	233
	Fuel - Lb/Hr	1107	1115	1154	1176	1199
S.L.	KIAS	214	213	211	211	211
	KTAS	209	211	212	214	216
	Fuel - Lb/Hr	1164	1187	1213	1236	1260

Figure 8-12
(Sheet 8 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 18,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.	.732				
	KTAS	409				
	Fuel - Lb/Hr	1034				
45	Mach Ind.	.723	.723	.723		
	KTAS	403	413	423		
	Fuel - Lb/Hr	985	1013	1041		
43	Mach Ind.	.709	.709	.707	.704	.704
	KTAS	396	405	413	415	420
	Fuel - Lb/Hr	948	978	1003	1006	1019
41	Mach Ind.	.694	.693	.692	.694	.693
	KTAS	387	396	404	409	414
	Fuel - Lb/Hr	934	962	983	1000	1010
39	Mach Ind.	.663	.664	.661	.664	.663
	KTAS	370	379	386	392	396
	Fuel - Lb/Hr	907	932	952	969	981
37	Mach Ind.	.644	.652	.645	.647	.651
	KTAS	359	372	376	382	388
	Fuel - Lb/Hr	896	933	945	962	981
35	Mach Ind.	.621	.628	.621	.622	.626
	KTAS	348	360	364	368	375
	Fuel - Lb/Hr	892	929	939	955	973
30	Mach Ind.	.577	.588	.573	.576	.582
	KTAS	330	344	343	348	355
	Fuel - Lb/Hr	926	965	964	983	1005
25	KIAS	211	216	217	213	214
	KTAS	301	314	322	320	324
	Fuel - Lb/Hr	937	983	1012	1005	1019
20	KIAS	216	216	216	216	216
	KTAS	284	290	295	298	301
	Fuel - Lb/Hr	996	1018	1035	1044	1058
15	KIAS	220	218	215	215	215
	KTAS	267	270	272	274	277
	Fuel - Lb/Hr	1055	1060	1070	1084	1100
10	KIAS	222	217	215	215	215
	KTAS	250	249	251	253	255
	Fuel - Lb/Hr	1106	1101	1119	1142	1167
5	KIAS	218	214	214	214	214
	KTAS	228	228	232	234	236
	Fuel - Lb/Hr	1126	1143	1185	1208	1231
S.L.	KIAS	216	215	214	214	214
	KTAS	210	213	215	217	219
	Fuel - Lb/Hr	1186	1210	1244	1269	1294

Figure 8-12
(Sheet 9 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 18,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.	.722				
	KTAS	403				
	Fuel - Lb/Hr	1063				
45	Mach Ind.	.723	.723			
	KTAS	404	413			
	Fuel - Lb/Hr	1019	1047			
43	Mach Ind.	.704	.713	.713	.710	
	KTAS	393	407	417	419	
	Fuel - Lb/Hr	968	1008	1037	1042	
41	Mach Ind.	.701	.701	.693	.704	.701
	KTAS	391	400	405	415	418
	Fuel - Lb/Hr	964	995	1009	1036	1043
39	Mach Ind.	.673	.668	.669	.666	.673
	KTAS	375	382	390	393	401
	Fuel - Lb/Hr	940	960	984	993	1016
37	Mach Ind.	.651	.654	.651	.654	.653
	KTAS	363	373	380	386	389
	Fuel - Lb/Hr	924	953	973	991	1002
35	Mach Ind.	.627	.636	.627	.630	.633
	KTAS	351	364	368	373	379
	Fuel - Lb/Hr	919	957	967	985	1003
30	Mach Ind.	.585	.598	.581	.584	.591
	KTAS	335	350	348	353	360
	Fuel - Lb/Hr	954	995	994	1013	1035
25	KIAS	215	219	220	217	217
	KTAS	306	318	326	325	329
	Fuel - Lb/Hr	968	1012	1035	1035	1049
20	KIAS	219	219	219	219	219
	KTAS	288	294	300	302	305
	Fuel - Lb/Hr	1021	1044	1061	1071	1086
15	KIAS	222	219	218	218	218
	KTAS	269	272	275	278	280
	Fuel - Lb/Hr	1075	1079	1097	1112	1126
10	KIAS	225	219	218	217	217
	KTAS	253	251	254	256	258
	Fuel - Lb/Hr	1130	1122	1149	1171	1198
5	KIAS	220	217	217	217	217
	KTAS	230	231	235	237	239
	Fuel - Lb/Hr	1147	1172	1217	1241	1264
S.L.	KIAS	218	217	217	217	217
	KTAS	212	215	218	220	222
	Fuel - Lb/Hr	1208	1234	1276	1301	1328

Figure 8-12
(Sheet 10 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 19,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.	.723	.723			
	KTAS	404	413			
	Fuel - Lb/Hr	1053	1083			
43	Mach Ind.	.713	.713	.713	.713	
	KTAS	398	408	417	421	
	Fuel - Lb/Hr	1009	1035	1063	1076	
41	Mach Ind.	.704	.704	.703	.704	.703
	KTAS	392	402	411	415	420
	Fuel - Lb/Hr	988	1021	1048	1058	1070
39	Mach Ind.	.685	.683	.683	.686	.684
	KTAS	382	390	399	405	408
	Fuel - Lb/Hr	975	1002	1025	1045	1054
37	Mach Ind.	.654	.654	.654	.654	.654
	KTAS	364	373	381	386	390
	Fuel - Lb/Hr	946	971	996	1011	1023
35	Mach Ind.	.634	.643	.634	.637	.641
	KTAS	355	368	372	377	384
	Fuel - Lb/Hr	946	984	996	1015	1033
30	Mach Ind.	.594	.604	.589	.592	.599
	KTAS	340	354	352	358	366
	Fuel - Lb/Hr	982	1020	1023	1044	1066
25	KIAS	219	223	219	220	220
	KTAS	311	323	324	329	333
	Fuel - Lb/Hr	998	1041	1046	1064	1079
20	KIAS	222	222	222	222	222
	KTAS	292	298	304	306	309
	Fuel - Lb/Hr	1047	1069	1087	1099	1114
15	KIAS	224	221	221	221	221
	KTAS	272	274	279	282	284
	Fuel - Lb/Hr	1095	1098	1124	1140	1158
10	KIAS	226	221	221	221	225
	KTAS	254	253	257	260	267
	Fuel - Lb/Hr	1147	1142	1177	1202	1251
5	KIAS	222	220	220	220	220
	KTAS	232	234	238	240	242
	Fuel - Lb/Hr	1167	1201	1248	1273	1299
S.L.	KIAS	220	220	220	220	220
	KTAS	214	217	221	223	225
	Fuel - Lb/Hr	1230	1262	1308	1334	1362

Figure 8-12
(Sheet 11 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 19,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
45	Mach Ind.	.728	.728			
	KTAS	406	416			
	Fuel – Lb/Hr	1097	1128			
43	Mach Ind.	.722	.722	.722		
	KTAS	403	413	422		
	Fuel – Lb/Hr	1052	1080	1109		
41	Mach Ind.	.704	.705	.704	.704	.704
	KTAS	392	403	411	415	420
	Fuel – Lb/Hr	1009	1046	1073	1081	1095
39	Mach Ind.	.691	.690	.688	.691	.690
	KTAS	385	394	402	408	412
	Fuel – Lb/Hr	1003	1033	1054	1074	1085
37	Mach Ind.	.654	.654	.654	.661	.656
	KTAS	365	373	382	390	391
	Fuel – Lb/Hr	965	992	1017	1041	1046
35	Mach Ind.	.641	.640	.640	.644	.643
	KTAS	359	367	375	382	385
	Fuel – Lb/Hr	973	998	1025	1045	1054
30	Mach Ind.	.602	.604	.596	.601	.604
	KTAS	345	354	356	363	369
	Fuel – Lb/Hr	1011	1034	1052	1074	1090
25	KIAS	222	226	222	223	224
	KTAS	316	328	329	334	338
	Fuel – Lb/Hr	1028	1070	1076	1094	1110
20	KIAS	225	225	225	225	225
	KTAS	295	302	308	310	313
	Fuel – Lb/Hr	1073	1094	1113	1128	1143
15	KIAS	226	224	224	224	224
	KTAS	274	278	283	285	288
	Fuel – Lb/Hr	1115	1124	1152	1169	1186
10	KIAS	228	224	223	223	227
	KTAS	256	256	261	263	270
	Fuel – Lb/Hr	1164	1168	1206	1230	1275
5	KIAS	223	223	223	223	239
	KTAS	233	237	241	243	263
	Fuel – Lb/Hr	1188	1230	1280	1306	1422
S.L.	KIAS	222	222	222	222	222
	KTAS	216	220	224	226	228
	Fuel – Lb/Hr	1259	1293	1341	1366	1394

Figure 8-12
(Sheet 12 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 20,000 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
45	Mach Ind.	.732				
	KTAS	409				
	Fuel – Lb/Hr	1143				
43	Mach Ind.	.723	.723	.723		
	KTAS	403	413	423		
	Fuel – Lb/Hr	1085	1114	1144		
41	Mach Ind.	.703	.712	.710	.704	.706
	KTAS	392	407	414	415	421
	Fuel – Lb/Hr	1035	1080	1108	1106	1124
39	Mach Ind.	.695	.695	.680	.695	.695
	KTAS	387	397	397	410	415
	Fuel – Lb/Hr	1028	1061	1064	1102	1113
37	Mach Ind.	.662	.662	.662	.662	.664
	KTAS	369	378	387	391	396
	Fuel – Lb/Hr	996	1025	1050	1063	1080
35	Mach Ind.	.647	.646	.646	.651	.648
	KTAS	362	371	379	386	388
	Fuel – Lb/Hr	1001	1027	1053	1075	1082
30	Mach Ind.	.604	.604	.603	.604	.604
	KTAS	346	354	361	365	369
	Fuel – Lb/Hr	1029	1048	1081	1096	1105
25	KIAS	226	230	225	226	227
	KTAS	321	333	334	338	343
	Fuel – Lb/Hr	1058	1098	1107	1124	1140
20	KIAS	228	228	228	228	228
	KTAS	299	306	311	314	317
	Fuel – Lb/Hr	1098	1120	1141	1156	1172
15	KIAS	228	227	227	227	227
	KTAS	277	281	286	289	292
	Fuel – Lb/Hr	1135	1150	1179	1198	1214
10	KIAS	229	226	225	224	229
	KTAS	257	259	263	264	272
	Fuel – Lb/Hr	1182	1195	1233	1251	1299
5	KIAS	226	226	226	226	241
	KTAS	236	240	244	247	266
	Fuel – Lb/Hr	1214	1260	1312	1338	1444
S.L.	KIAS	225	225	225	225	225
	KTAS	219	223	227	229	231
	Fuel – Lb/Hr	1289	1323	1372	1400	1429

Figure 8-12
(Sheet 13 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 20,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind. KTAS Fuel - Lb/Hr					
49	Mach Ind. KTAS Fuel - Lb/Hr					
47	Mach Ind. KTAS Fuel - Lb/Hr					
45	Mach Ind. KTAS Fuel - Lb/Hr	.722 403 1173				
43	Mach Ind. KTAS Fuel - Lb/Hr	.723 403 1117	.723 413 1148	.723 423 1179		
41	Mach Ind. KTAS Fuel - Lb/Hr	.707 394 1068	.713 407 1105	.713 417 1139	.710 419 1145	.711 425 1160
39	Mach Ind. KTAS Fuel - Lb/Hr	.704 392 1060	.704 402 1096	.695 406 1111	.704 415 1137	.704 420 1149
37	Mach Ind. KTAS Fuel - Lb/Hr	.671 374 1028	.671 383 1059	.670 391 1083	.670 395 1097	.672 401 1114
35	Mach Ind. KTAS Fuel - Lb/Hr	.653 366 1028	.653 374 1056	.653 383 1083	.654 388 1098	.653 391 1111
30	Mach Ind. KTAS Fuel - Lb/Hr	.604 346 1044	.604 354 1065	.604 361 1099	.604 365 1112	.604 369 1121
25	KIAS KTAS Fuel - Lb/Hr	230 326 1087	232 337 1124	229 338 1137	229 343 1153	230 347 1170
20	KIAS KTAS Fuel - Lb/Hr	231 303 1124	231 309 1145	230 313 1163	230 316 1178	230 319 1193
15	KIAS KTAS Fuel - Lb/Hr	230 279 1156	230 284 1175	230 290 1207	230 293 1226	230 295 1242
10	KIAS KTAS Fuel - Lb/Hr	230 259 1200	229 263 1222	227 265 1257	229 270 1293	232 275 1324
5	KIAS KTAS Fuel - Lb/Hr	229 239 1241	228 243 1290	228 247 1344	243 265 1450	244 268 1466
S.L.	KIAS KTAS Fuel - Lb/Hr	228 222 1317	228 226 1353	228 230 1405	228 232 1434	228 233 1464

Figure 8-12
(Sheet 14 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 21,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
43	Mach Ind.	.723	.723			
	KTAS	403	413			
	Fuel - Lb/Hr	1152	1184			
41	Mach Ind.	.715	.715	.715	.715	
	KTAS	399	408	418	422	
	Fuel - Lb/Hr	1108	1135	1168	1180	
39	Mach Ind.	.699	.703	.703	.703	.703
	KTAS	390	402	411	415	420
	Fuel - Lb/Hr	1077	1118	1150	1159	1172
37	Mach Ind.	.684	.684	.683	.684	.684
	KTAS	381	391	399	404	408
	Fuel - Lb/Hr	1068	1101	1124	1142	1156
35	Mach Ind.	.654	.654	.654	.654	.654
	KTAS	366	375	383	387	391
	Fuel - Lb/Hr	1046	1077	1103	1116	1132
30	Mach Ind.	.605	.604	.604	.605	.605
	KTAS	346	354	361	366	369
	Fuel - Lb/Hr	1061	1082	1116	1130	1139
25	KIAS	233	232	232	232	233
	KTAS	331	337	343	347	352
	Fuel - Lb/Hr	1117	1138	1167	1183	1201
20	KIAS	234	234	230	230	230
	KTAS	306	313	313	316	319
	Fuel - Lb/Hr	1151	1171	1177	1192	1208
15	KIAS	233	233	233	233	233
	KTAS	282	288	293	296	299
	Fuel - Lb/Hr	1180	1202	1237	1255	1271
10	KIAS	232	232	229	232	234
	KTAS	261	266	267	273	278
	Fuel - Lb/Hr	1220	1251	1282	1319	1348
5	KIAS	231	231	231	245	245
	KTAS	242	246	250	267	270
	Fuel - Lb/Hr	1269	1321	1377	1469	1487
S.L.	KIAS	231	231	231	231	269
	KTAS	224	228	232	234	275
	Fuel - Lb/Hr	1347	1384	1439	1468	1746

Figure 8-12
(Sheet 15 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 21,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
43	Mach Ind.	.728	.728			
	KTAS	407	416			
	Fuel – Lb/Hr	1198	1231			
41	Mach Ind.	.723	.723	.723	.723	
	KTAS	403	413	422	427	
	Fuel – Lb/Hr	1151	1181	1212	1228	
39	Mach Ind.	.703	.704	.704	.704	.704
	KTAS	392	402	411	415	420
	Fuel – Lb/Hr	1109	1141	1175	1182	1198
37	Mach Ind.	.690	.690	.678	.690	.689
	KTAS	384	394	396	407	411
	Fuel – Lb/Hr	1095	1130	1137	1175	1186
35	Mach Ind.	.655	.655	.655	.655	.655
	KTAS	367	376	384	388	392
	Fuel – Lb/Hr	1067	1099	1125	1139	1155
30	Mach Ind.	.612	.604	.610	.612	.612
	KTAS	351	354	365	370	374
	Fuel – Lb/Hr	1089	1100	1144	1160	1170
25	KIAS	237	230	235	235	236
	KTAS	336	334	347	352	356
	Fuel – Lb/Hr	1147	1143	1197	1213	1231
20	KIAS	237	237	231	231	232
	KTAS	310	316	315	319	323
	Fuel – Lb/Hr	1177	1198	1199	1215	1235
15	KIAS	236	236	235	235	236
	KTAS	286	291	297	300	302
	Fuel – Lb/Hr	1206	1229	1265	1283	1299
10	KIAS	235	235	235	235	236
	KTAS	264	269	274	277	281
	Fuel – Lb/Hr	1246	1279	1327	1347	1372
5	KIAS	234	234	245	245	247
	KTAS	244	249	265	268	272
	Fuel – Lb/Hr	1295	1352	1467	1483	1508
S.L.	KIAS	233	233	233	233	254
	KTAS	227	231	235	237	260
	Fuel – Lb/Hr	1378	1416	1471	1501	1651

Figure 8-12
(Sheet 16 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 22,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
43	Mach Ind.	.732	.732			
	KTAS	409	419			
	Fuel - Lb/Hr	1245	1280			
41	Mach Ind.	.723	.723	.723		
	KTAS	403	413	423		
	Fuel - Lb/Hr	1183	1214	1246		
39	Mach Ind.	.703	.710	.708	.703	.704
	KTAS	392	405	414	415	420
	Fuel - Lb/Hr	1135	1174	1208	1206	1224
37	Mach Ind.	.685	.695	.679	.695	.695
	KTAS	382	397	396	410	414
	Fuel - Lb/Hr	1107	1158	1162	1203	1216
35	Mach Ind.	.663	.662	.662	.662	.662
	KTAS	371	380	388	393	397
	Fuel - Lb/Hr	1098	1131	1157	1174	1189
30	Mach Ind.	.619	.609	.616	.619	.610
	KTAS	355	357	369	374	373
	Fuel - Lb/Hr	1117	1128	1174	1191	1186
25	KIAS	240	233	238	238	239
	KTAS	341	338	352	356	361
	Fuel - Lb/Hr	1177	1174	1226	1242	1261
20	KIAS	239	237	234	235	235
	KTAS	314	317	320	323	327
	Fuel - Lb/Hr	1203	1212	1231	1248	1267
15	KIAS	238	238	238	238	238
	KTAS	289	295	300	303	306
	Fuel - Lb/Hr	1231	1255	1293	1311	1327
10	KIAS	238	237	238	238	239
	KTAS	267	272	277	280	284
	Fuel - Lb/Hr	1272	1307	1356	1374	1397
5	KIAS	237	237	246	247	249
	KTAS	247	252	266	270	274
	Fuel - Lb/Hr	1324	1383	1483	1504	1526
S.L.	KIAS	236	236	236	270	256
	KTAS	230	234	238	274	262
	Fuel - Lb/Hr	1408	1446	1505	1758	1670

Figure 8-12
(Sheet 17 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 22,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
43	Mach Ind.	.722				
	KTAS	403				
	Fuel - Lb/Hr	1268				
41	Mach Ind.	.723	.723	.723		
	KTAS	404	413	423		
	Fuel - Lb/Hr	1215	1249	1281		
39	Mach Ind.	.706	.711	.713	.707	.706
	KTAS	394	406	417	417	422
	Fuel - Lb/Hr	1165	1199	1242	1240	1255
37	Mach Ind.	.693	.702	.694	.703	.702
	KTAS	387	401	405	415	419
	Fuel - Lb/Hr	1145	1191	1212	1238	1251
35	Mach Ind.	.671	.670	.670	.669	.669
	KTAS	376	384	393	397	401
	Fuel - Lb/Hr	1130	1165	1191	1209	1223
30	Mach Ind.	.626	.615	.623	.626	.616
	KTAS	359	360	373	378	376
	Fuel - Lb/Hr	1146	1158	1205	1222	1216
25	KIAS	244	236	241	241	242
	KTAS	345	342	356	360	365
	Fuel - Lb/Hr	1206	1204	1257	1273	1291
20	KIAS	242	237	238	238	239
	KTAS	317	317	324	328	332
	Fuel - Lb/Hr	1229	1226	1263	1280	1299
15	KIAS	241	240	241	241	241
	KTAS	292	297	304	307	309
	Fuel - Lb/Hr	1256	1278	1322	1340	1355
10	KIAS	240	238	240	240	241
	KTAS	270	273	280	283	286
	Fuel - Lb/Hr	1299	1329	1383	1401	1421
5	KIAS	239	238	248	249	250
	KTAS	250	254	268	272	275
	Fuel - Lb/Hr	1352	1409	1505	1525	1545
S.L.	KIAS	239	239	239	257	257
	KTAS	232	236	241	261	264
	Fuel - Lb/Hr	1439	1479	1539	1677	1691

Figure 8-12
(Sheet 18 of 19)

MAXIMUM RANGE CRUISE
TWO ENGINE

WEIGHT - 23,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
43	Mach Ind.	.726				
	KTAS	405				
	Fuel - Lb/Hr	1323				
41	Mach Ind.	.723	.723	.723		
	KTAS	404	413	423		
	Fuel - Lb/Hr	1249	1284	1317		
39	Mach Ind.	.713	.713	.713	.713	.713
	KTAS	398	407	417	421	426
	Fuel - Lb/Hr	1204	1231	1267	1280	1295
37	Mach Ind.	.699	.703	.703	.703	.702
	KTAS	390	402	411	415	419
	Fuel - Lb/Hr	1179	1215	1252	1262	1273
35	Mach Ind.	.668	.683	.668	.686	.676
	KTAS	374	392	392	407	405
	Fuel - Lb/Hr	1147	1208	1209	1261	1255
30	Mach Ind.	.625	.621	.628	.624	.621
	KTAS	358	364	376	377	380
	Fuel - Lb/Hr	1161	1187	1234	1237	1247
25	KIAS	247	239	244	244	245
	KTAS	349	347	360	364	370
	Fuel - Lb/Hr	1234	1235	1287	1302	1322
20	KIAS	245	240	241	241	242
	KTAS	321	321	329	332	336
	Fuel - Lb/Hr	1256	1257	1294	1313	1331
15	KIAS	244	243	244	244	244
	KTAS	296	301	307	310	313
	Fuel - Lb/Hr	1282	1308	1350	1368	1383
10	KIAS	243	240	243	243	243
	KTAS	273	275	283	286	289
	Fuel - Lb/Hr	1325	1352	1410	1428	1445
5	KIAS	242	240	250	251	252
	KTAS	253	256	270	274	277
	Fuel - Lb/Hr	1381	1435	1528	1546	1565
S.L.	KIAS	241	241	259	259	259
	KTAS	235	239	261	263	265
	Fuel - Lb/Hr	1469	1511	1683	1696	1710

Figure 8-12
(Sheet 19 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 14,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.	.746				
	KTAS	416				
	Fuel - Lb/Hr	843				
49	Mach Ind.	.734	.735	.726		
	KTAS	409	420	424		
	Fuel - Lb/Hr	800	826	832		
47	Mach Ind.	.721	.723	.724	.724	
	KTAS	402	413	423	428	
	Fuel - Lb/Hr	779	806	828	838	
45	Mach Ind.	.712	.713	.714	.714	.714
	KTAS	397	407	417	421	426
	Fuel - Lb/Hr	779	803	826	836	846
43	Mach Ind.	.700	.696	.695	.697	.698
	KTAS	390	397	406	411	416
	Fuel - Lb/Hr	779	796	815	828	839
41	Mach Ind.	.684	.673	.677	.674	.676
	KTAS	381	384	395	397	403
	Fuel - Lb/Hr	777	785	809	815	829
39	Mach Ind.	.661	.646	.657	.650	.646
	KTAS	368	368	383	383	385
	Fuel - Lb/Hr	769	769	804	803	808
37	Mach Ind.	.629	.623	.630	.629	.623
	KTAS	350	355	367	370	371
	Fuel - Lb/Hr	747	764	793	800	801
35	Mach Ind.	.610	.606	.612	.612	.607
	KTAS	341	347	358	362	363
	Fuel - Lb/Hr	758	777	807	816	817
30	Mach Ind.	.541	.538	.544	.547	.550
	KTAS	309	314	325	330	335
	Fuel - Lb/Hr	762	780	813	828	843
25	KIAS	205	202	206	208	208
	KTAS	291	294	305	311	315
	Fuel - Lb/Hr	812	826	868	886	896
20	KIAS	205	211	214	213	211
	KTAS	269	282	292	294	294
	Fuel - Lb/Hr	858	911	944	948	946
15	KIAS	221	221	218	214	212
	KTAS	268	273	274	272	271
	Fuel - Lb/Hr	990	1004	1002	993	990
10	KIAS	224	220	214	211	208
	KTAS	251	251	250	248	247
	Fuel - Lb/Hr	1048	1036	1028	1025	1025
5	KIAS	220	215	210	209	207
	KTAS	230	228	227	228	228
	Fuel - Lb/Hr	1059	1055	1063	1073	1084
S.L.	KIAS	218	216	213	212	211
	KTAS	212	214	214	215	215
	Fuel - Lb/Hr	1109	1125	1141	1153	1166

Figure 8-13
(Sheet 1 of 19)

LONG RANGE CRUISE
TWO ENGINE

ALTITUDE — 1000 FEET	WEIGHT - 14,500 LB	ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.	.744				
	KTAS	416				
	Fuel - Lb/Hr	876				
49	Mach Ind.	.738	.739			
	KTAS	412	422			
	Fuel - Lb/Hr	837	861			
47	Mach Ind.	.728	.729	.729	.727	
	KTAS	406	416	426	430	
	Fuel - Lb/Hr	811	836	857	865	
45	Mach Ind.	.716	.715	.717	.718	.717
	KTAS	399	408	418	424	428
	Fuel - Lb/Hr	805	827	851	865	872
43	Mach Ind.	.699	.705	.703	.704	.704
	KTAS	390	402	410	415	420
	Fuel - Lb/Hr	796	826	845	858	868
41	Mach Ind.	.682	.683	.682	.682	.687
	KTAS	380	389	398	402	409
	Fuel - Lb/Hr	790	815	834	845	862
39	Mach Ind.	.662	.657	.664	.657	.658
	KTAS	368	374	387	387	392
	Fuel - Lb/Hr	784	802	831	831	843
37	Mach Ind.	.634	.630	.638	.633	.630
	KTAS	353	359	372	373	375
	Fuel - Lb/Hr	769	789	820	821	828
35	Mach Ind.	.614	.613	.619	.617	.612
	KTAS	343	351	362	365	366
	Fuel - Lb/Hr	778	803	831	837	839
30	Mach Ind.	.550	.549	.555	.558	.559
	KTAS	314	321	331	336	341
	Fuel - Lb/Hr	789	811	844	858	871
25	KIAS	205	206	209	210	211
	KTAS	292	299	310	315	319
	Fuel - Lb/Hr	825	856	894	910	920
20	KIAS	207	214	217	216	213
	KTAS	272	286	296	297	297
	Fuel - Lb/Hr	878	937	967	969	966
15	KIAS	224	223	220	216	213
	KTAS	271	276	277	275	274
	Fuel - Lb/Hr	1012	1024	1024	1013	1010
10	KIAS	227	222	216	213	210
	KTAS	254	254	252	250	249
	Fuel - Lb/Hr	1070	1057	1049	1048	1049
5	KIAS	222	217	213	211	210
	KTAS	232	230	230	230	231
	Fuel - Lb/Hr	1080	1077	1088	1099	1111
S.L.	KIAS	220	219	215	214	213
	KTAS	214	216	217	217	218
	Fuel - Lb/Hr	1132	1150	1167	1180	1195

Figure 8-13
(Sheet 2 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 15,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.	.743	.743			
	KTAS	415	425			
	Fuel - Lb/Hr	878	902			
47	Mach Ind.	.733	.732	.730		
	KTAS	409	418	426		
	Fuel - Lb/Hr	843	866	884		
45	Mach Ind.	.721	.720	.720	.722	.720
	KTAS	402	411	420	426	430
	Fuel - Lb/Hr	834	856	878	892	899
43	Mach Ind.	.708	.711	.709	.709	.710
	KTAS	394	406	414	418	423
	Fuel - Lb/Hr	827	855	875	886	898
41	Mach Ind.	.688	.691	.689	.689	.693
	KTAS	383	394	402	406	413
	Fuel - Lb/Hr	815	845	862	874	891
39	Mach Ind.	.665	.667	.669	.666	.668
	KTAS	370	380	390	392	398
	Fuel - Lb/Hr	805	833	855	862	877
37	Mach Ind.	.639	.638	.648	.637	.638
	KTAS	355	364	378	375	380
	Fuel - Lb/Hr	790	816	849	842	856
35	Mach Ind.	.618	.620	.625	.619	.619
	KTAS	346	355	366	366	370
	Fuel - Lb/Hr	797	827	854	854	866
30	Mach Ind.	.557	.560	.566	.568	.564
	KTAS	318	327	338	342	344
	Fuel - Lb/Hr	814	843	876	889	893
25	KIAS	208	209	212	213	213
	KTAS	296	304	314	319	322
	Fuel - Lb/Hr	847	883	919	934	943
20	KIAS	211	217	219	218	215
	KTAS	276	290	299	300	299
	Fuel - Lb/Hr	905	962	989	989	985
15	KIAS	226	225	221	218	215
	KTAS	274	278	279	277	276
	Fuel - Lb/Hr	1033	1043	1041	1032	1029
10	KIAS	229	224	218	215	212
	KTAS	257	257	254	253	251
	Fuel - Lb/Hr	1090	1079	1070	1070	1073
5	KIAS	225	219	215	213	212
	KTAS	234	232	232	233	233
	Fuel - Lb/Hr	1101	1099	1112	1125	1137
S.L.	KIAS	223	221	218	217	215
	KTAS	216	219	219	220	220
	Fuel - Lb/Hr	1157	1176	1193	1208	1223

Figure 8-13
(Sheet 3 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 15,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.	.746	.743			
	KTAS	416	425			
	Fuel - Lb/Hr	916	935			
47	Mach Ind.	.733	.733	.735		
	KTAS	409	419	430		
	Fuel - Lb/Hr	870	896	923		
45	Mach Ind.	.726	.725	.725	.725	.724
	KTAS	405	414	424	428	432
	Fuel - Lb/Hr	862	886	909	919	928
43	Mach Ind.	.715	.713	.715	.714	.715
	KTAS	399	407	418	422	427
	Fuel - Lb/Hr	858	879	905	916	928
41	Mach Ind.	.696	.699	.696	.696	.698
	KTAS	388	399	406	411	416
	Fuel - Lb/Hr	845	875	891	904	918
39	Mach Ind.	.673	.676	.674	.674	.678
	KTAS	375	386	393	397	404
	Fuel - Lb/Hr	833	864	879	892	911
37	Mach Ind.	.645	.649	.653	.646	.649
	KTAS	359	370	381	380	386
	Fuel - Lb/Hr	815	848	873	873	891
35	Mach Ind.	.624	.627	.632	.623	.625
	KTAS	349	359	370	369	374
	Fuel - Lb/Hr	820	852	878	876	892
30	Mach Ind.	.566	.570	.576	.576	.570
	KTAS	323	333	344	347	347
	Fuel - Lb/Hr	843	874	907	916	916
25	KIAS	210	212	214	216	215
	KTAS	299	308	318	323	325
	Fuel - Lb/Hr	872	909	944	958	962
20	KIAS	214	220	222	220	217
	KTAS	281	294	302	303	302
	Fuel - Lb/Hr	933	987	1012	1010	1006
15	KIAS	229	228	223	219	217
	KTAS	277	281	281	279	278
	Fuel - Lb/Hr	1055	1063	1060	1051	1049
10	KIAS	231	226	220	217	214
	KTAS	260	259	256	255	254
	Fuel - Lb/Hr	1112	1101	1092	1093	1097
5	KIAS	227	221	217	216	214
	KTAS	237	234	235	235	236
	Fuel - Lb/Hr	1123	1122	1138	1152	1166
S.L.	KIAS	225	223	220	219	217
	KTAS	218	221	221	222	223
	Fuel - Lb/Hr	1180	1199	1219	1235	1250

Figure 8-13
(Sheet 4 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 16,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.	.746				
	KTAS	416				
	Fuel - Lb/Hr	954				
47	Mach Ind.	.737	.737			
	KTAS	411	421			
	Fuel - Lb/Hr	907	933			
45	Mach Ind.	.732	.730	.731	.729	
	KTAS	408	417	427	430	
	Fuel - Lb/Hr	893	917	942	948	
43	Mach Ind.	.719	.716	.717	.719	.718
	KTAS	401	409	419	424	428
	Fuel - Lb/Hr	884	905	929	944	954
41	Mach Ind.	.704	.707	.703	.703	.704
	KTAS	393	403	410	415	420
	Fuel - Lb/Hr	876	905	922	934	948
39	Mach Ind.	.681	.685	.681	.681	.688
	KTAS	379	391	397	402	410
	Fuel - Lb/Hr	862	895	909	923	944
37	Mach Ind.	.655	.660	.658	.656	.659
	KTAS	364	376	383	387	393
	Fuel - Lb/Hr	846	881	896	907	925
35	Mach Ind.	.630	.634	.636	.629	.632
	KTAS	352	363	372	372	378
	Fuel - Lb/Hr	844	878	899	901	919
30	Mach Ind.	.575	.581	.587	.580	.579
	KTAS	329	340	351	350	353
	Fuel - Lb/Hr	873	906	938	937	947
25	KIAS	213	215	217	218	216
	KTAS	303	312	322	327	326
	Fuel - Lb/Hr	897	935	969	982	978
20	KIAS	218	223	224	222	219
	KTAS	285	298	306	306	305
	Fuel - Lb/Hr	962	1013	1034	1032	1027
15	KIAS	231	229	225	221	218
	KTAS	280	283	283	281	280
	Fuel - Lb/Hr	1077	1082	1079	1071	1070
10	KIAS	234	228	222	219	216
	KTAS	262	261	259	257	257
	Fuel - Lb/Hr	1132	1119	1114	1117	1125
5	KIAS	229	223	219	218	217
	KTAS	239	237	237	238	239
	Fuel - Lb/Hr	1147	1145	1164	1178	1195
S.L.	KIAS	227	225	222	221	220
	KTAS	220	223	223	224	225
	Fuel - Lb/Hr	1203	1224	1245	1262	1280

Figure 8-13
(Sheet 5 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 16,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.	.743				
	KTAS	415				
	Fuel - Lb/Hr	988				
47	Mach Ind.	.742	.742			
	KTAS	414	424			
	Fuel - Lb/Hr	948	975			
45	Mach Ind.	.732	.734	.734	.730	
	KTAS	408	420	429	431	
	Fuel - Lb/Hr	917	948	972	976	
43	Mach Ind.	.722	.721	.718	.722	.720
	KTAS	403	412	419	426	430
	Fuel - Lb/Hr	909	934	953	972	979
41	Mach Ind.	.710	.709	.709	.708	.710
	KTAS	396	405	414	418	423
	Fuel - Lb/Hr	905	928	952	963	978
39	Mach Ind.	.688	.694	.687	.689	.692
	KTAS	383	396	401	406	412
	Fuel - Lb/Hr	891	926	938	953	970
37	Mach Ind.	.662	.669	.663	.664	.668
	KTAS	369	382	387	392	398
	Fuel - Lb/Hr	874	913	923	939	958
35	Mach Ind.	.636	.642	.639	.636	.639
	KTAS	356	367	374	376	382
	Fuel - Lb/Hr	869	905	921	929	947
30	Mach Ind.	.585	.591	.593	.584	.589
	KTAS	334	346	354	353	359
	Fuel - Lb/Hr	903	937	962	959	979
25	KIAS	216	218	220	220	217
	KTAS	307	316	326	329	328
	Fuel - Lb/Hr	921	961	995	1002	997
20	KIAS	221	226	226	224	221
	KTAS	290	302	309	309	307
	Fuel - Lb/Hr	990	1038	1057	1054	1048
15	KIAS	234	231	226	222	220
	KTAS	283	285	285	283	282
	Fuel - Lb/Hr	1098	1101	1097	1091	1092
10	KIAS	236	230	224	221	218
	KTAS	265	263	261	260	259
	Fuel - Lb/Hr	1153	1139	1136	1142	1151
5	KIAS	231	224	221	220	219
	KTAS	241	239	239	240	241
	Fuel - Lb/Hr	1166	1168	1189	1206	1223
S.L.	KIAS	228	227	224	223	222
	KTAS	222	225	225	226	227
	Fuel - Lb/Hr	1225	1249	1271	1291	1307

Figure 8-13
(Sheet 6 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 17,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.	.745	.745			
	KTAS	416	426			
	Fuel - Lb/Hr	988	1016			
45	Mach Ind.	.733	.734	.735		
	KTAS	409	419	430		
	Fuel - Lb/Hr	945	973	1002		
43	Mach Ind.	.726	.725	.724	.725	.723
	KTAS	405	414	423	428	432
	Fuel - Lb/Hr	935	963	986	998	1007
41	Mach Ind.	.715	.711	.714	.713	.714
	KTAS	399	406	417	421	426
	Fuel - Lb/Hr	933	953	981	994	1007
39	Mach Ind.	.695	.700	.693	.695	.696
	KTAS	387	399	404	410	415
	Fuel - Lb/Hr	920	953	967	983	996
37	Mach Ind.	.669	.678	.670	.672	.678
	KTAS	373	387	391	396	404
	Fuel - Lb/Hr	903	944	952	971	991
35	Mach Ind.	.645	.652	.645	.646	.649
	KTAS	361	373	377	382	388
	Fuel - Lb/Hr	899	938	946	962	982
30	Mach Ind.	.594	.601	.596	.593	.597
	KTAS	340	351	356	358	364
	Fuel - Lb/Hr	933	967	982	990	1010
25	KIAS	219	221	224	221	220
	KTAS	311	321	331	331	333
	Fuel - Lb/Hr	948	990	1024	1022	1027
20	KIAS	225	229	229	226	223
	KTAS	294	306	312	311	310
	Fuel - Lb/Hr	1018	1064	1081	1075	1071
15	KIAS	236	233	228	224	222
	KTAS	285	288	287	285	285
	Fuel - Lb/Hr	1119	1121	1116	1111	1115
10	KIAS	238	231	225	223	221
	KTAS	267	265	263	262	262
	Fuel - Lb/Hr	1174	1160	1158	1167	1178
5	KIAS	233	226	223	223	222
	KTAS	243	241	242	243	244
	Fuel - Lb/Hr	1188	1192	1217	1236	1254
S.L.	KIAS	230	229	226	225	224
	KTAS	224	227	227	229	229
	Fuel - Lb/Hr	1248	1274	1298	1318	1337

Figure 8-13
(Sheet 7 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 17,500 LB		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.	.746	.741			
	KTAS	416	424			
	Fuel - Lb/Hr	1025	1042			
45	Mach Ind.	.737	.737	.737		
	KTAS	411	421	431		
	Fuel - Lb/Hr	982	1009	1036		
43	Mach Ind.	.730	.730	.729	.727	.727
	KTAS	407	417	426	430	434
	Fuel - Lb/Hr	963	993	1019	1025	1038
41	Mach Ind.	.719	.716	.716	.718	.717
	KTAS	401	409	418	424	428
	Fuel - Lb/Hr	958	983	1006	1024	1034
39	Mach Ind.	.703	.702	.699	.701	.702
	KTAS	392	401	408	413	419
	Fuel - Lb/Hr	950	976	996	1012	1026
37	Mach Ind.	.676	.687	.677	.680	.684
	KTAS	377	392	395	401	408
	Fuel - Lb/Hr	932	975	982	1002	1021
35	Mach Ind.	.653	.661	.653	.655	.659
	KTAS	366	378	382	388	394
	Fuel - Lb/Hr	930	969	978	996	1015
30	Mach Ind.	.603	.609	.601	.602	.606
	KTAS	345	356	359	364	370
	Fuel - Lb/Hr	963	995	1004	1022	1041
25	KIAS	222	225	226	223	224
	KTAS	316	327	335	334	338
	Fuel - Lb/Hr	978	1020	1050	1045	1058
20	KIAS	228	232	231	227	225
	KTAS	299	310	315	313	313
	Fuel - Lb/Hr	1046	1088	1102	1094	1095
15	KIAS	238	235	229	226	224
	KTAS	288	290	288	287	288
	Fuel - Lb/Hr	1140	1140	1136	1134	1141
10	KIAS	240	233	227	225	223
	KTAS	269	266	265	265	265
	Fuel - Lb/Hr	1195	1179	1180	1193	1208
5	KIAS	234	228	226	225	224
	KTAS	245	243	244	245	247
	Fuel - Lb/Hr	1209	1215	1245	1264	1285
S.L.	KIAS	232	231	228	227	227
	KTAS	226	229	230	231	232
	Fuel - Lb/Hr	1272	1299	1326	1347	1369

ALTITUDE — 1000 FEET

Figure 8-13
(Sheet 8 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 18,000 LB			TEMPERATURE — °C				
			ISA -10	ISA	ISA +10	ISA +15	ISA +20
ALTITUDE — 1000 FEET	51	Mach Ind.					
		KTAS					
		Fuel - Lb/Hr					
	49	Mach Ind.					
		KTAS					
		Fuel - Lb/Hr					
	47	Mach Ind.	.745				
		KTAS	416				
		Fuel - Lb/Hr	1063				
	45	Mach Ind.	.740	.740			
		KTAS	413	423			
		Fuel - Lb/Hr	1020	1048			
	43	Mach Ind.	.728	.735	.734	.732	
		KTAS	406	420	429	432	
		Fuel - Lb/Hr	984	1024	1053	1058	
	41	Mach Ind.	.721	.720	.717	.721	.720
		KTAS	402	411	419	426	430
		Fuel - Lb/Hr	982	1011	1028	1050	1060
	39	Mach Ind.	.708	.705	.706	.705	.708
		KTAS	395	402	412	416	422
		Fuel - Lb/Hr	978	999	1027	1040	1057
	37	Mach Ind.	.683	.690	.683	.688	.688
		KTAS	380	394	398	406	410
		Fuel - Lb/Hr	960	998	1011	1034	1046
	35	Mach Ind.	.661	.669	.660	.664	.667
		KTAS	370	383	387	393	399
		Fuel - Lb/Hr	959	999	1009	1029	1048
	30	Mach Ind.	.610	.615	.607	.609	.612
		KTAS	349	360	363	368	373
		Fuel - Lb/Hr	990	1020	1031	1050	1068
	25	KIAS	226	229	228	227	227
		KTAS	321	332	337	339	343
		Fuel - Lb/Hr	1009	1051	1070	1075	1090
	20	KIAS	231	234	232	229	228
		KTAS	303	313	317	315	317
		Fuel - Lb/Hr	1072	1110	1120	1115	1126
	15	KIAS	240	236	231	228	228
		KTAS	291	292	291	290	293
		Fuel - Lb/Hr	1160	1159	1157	1157	1177
	10	KIAS	242	234	229	227	229
		KTAS	271	268	267	267	272
		Fuel - Lb/Hr	1214	1199	1203	1219	1254
	5	KIAS	236	230	228	227	227
		KTAS	247	245	247	248	250
		Fuel - Lb/Hr	1231	1240	1273	1295	1316
	S.L.	KIAS	234	233	230	230	229
		KTAS	227	231	232	233	234
		Fuel - Lb/Hr	1295	1325	1355	1376	1399

Figure 8-13
(Sheet 9 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 18,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.	.742				
	KTAS	415				
	Fuel - Lb/Hr	1100				
45	Mach Ind.	.744	.744			
	KTAS	415	425			
	Fuel - Lb/Hr	1059	1089			
43	Mach Ind.	.732	.735	.737	.734	
	KTAS	408	420	430	433	
	Fuel - Lb/Hr	1016	1050	1082	1088	
41	Mach Ind.	.724	.724	.721	.724	.722
	KTAS	404	413	421	428	431
	Fuel - Lb/Hr	1006	1039	1059	1077	1086
39	Mach Ind.	.713	.711	.711	.710	.712
	KTAS	398	406	415	419	425
	Fuel - Lb/Hr	1006	1031	1057	1069	1086
37	Mach Ind.	.689	.692	.689	.694	.691
	KTAS	384	395	402	409	412
	Fuel - Lb/Hr	988	1018	1040	1063	1071
35	Mach Ind.	.667	.673	.667	.671	.673
	KTAS	373	386	391	398	403
	Fuel - Lb/Hr	987	1023	1039	1061	1077
30	Mach Ind.	.617	.620	.613	.615	.618
	KTAS	353	363	366	371	377
	Fuel - Lb/Hr	1016	1043	1058	1077	1094
25	KIAS	230	232	230	230	230
	KTAS	326	337	340	344	348
	Fuel - Lb/Hr	1041	1080	1092	1107	1121
20	KIAS	234	236	233	231	231
	KTAS	306	316	318	318	321
	Fuel - Lb/Hr	1098	1133	1137	1137	1155
15	KIAS	242	238	232	230	233
	KTAS	293	294	293	293	299
	Fuel - Lb/Hr	1182	1179	1178	1184	1215
10	KIAS	243	236	231	229	240
	KTAS	273	270	269	270	285
	Fuel - Lb/Hr	1232	1220	1227	1245	1333
5	KIAS	238	232	230	230	247
	KTAS	248	247	249	251	272
	Fuel - Lb/Hr	1252	1265	1302	1325	1451
S.L.	KIAS	236	235	233	232	231
	KTAS	229	233	234	235	237
	Fuel - Lb/Hr	1320	1350	1384	1406	1431

Figure 8-13
(Sheet 10 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 19,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.	.745	.745			
	KTAS	416	426			
	Fuel - Lb/Hr	1097	1128			
43	Mach Ind.	.735	.735	.735	.734	.664
	KTAS	410	420	430	434	397
	Fuel - Lb/Hr	1050	1077	1107	1119	1043
41	Mach Ind.	.726	.728	.726	.727	.725
	KTAS	405	416	424	430	433
	Fuel - Lb/Hr	1030	1067	1093	1105	1114
39	Mach Ind.	.717	.715	.714	.716	.716
	KTAS	400	408	417	423	427
	Fuel - Lb/Hr	1031	1060	1084	1103	1114
37	Mach Ind.	.695	.695	.694	.697	.696
	KTAS	387	396	405	411	415
	Fuel - Lb/Hr	1016	1042	1068	1088	1100
35	Mach Ind.	.674	.675	.673	.679	.677
	KTAS	377	387	394	402	405
	Fuel - Lb/Hr	1016	1043	1068	1093	1102
30	Mach Ind.	.623	.622	.618	.621	.623
	KTAS	357	364	370	375	380
	Fuel - Lb/Hr	1042	1060	1085	1105	1119
25	KIAS	233	236	233	233	234
	KTAS	331	341	344	348	353
	Fuel - Lb/Hr	1071	1110	1121	1138	1153
20	KIAS	236	238	234	233	234
	KTAS	309	319	319	321	325
	Fuel - Lb/Hr	1123	1156	1154	1163	1181
15	KIAS	244	240	234	234	236
	KTAS	296	296	295	297	303
	Fuel - Lb/Hr	1203	1200	1200	1216	1246
10	KIAS	244	237	232	233	248
	KTAS	274	272	271	274	294
	Fuel - Lb/Hr	1250	1239	1251	1279	1392
5	KIAS	240	234	233	232	258
	KTAS	250	249	252	253	283
	Fuel - Lb/Hr	1275	1292	1332	1356	1533
S.L.	KIAS	238	237	235	234	234
	KTAS	231	235	236	238	239
	Fuel - Lb/Hr	1343	1376	1413	1437	1464

Figure 8-13
(Sheet 11 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 19,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.	.745	.746			
	KTAS	416	426			
	Fuel - Lb/Hr	1135	1168			
43	Mach Ind.	.738	.738	.738		
	KTAS	412	422	432		
	Fuel - Lb/Hr	1086	1114	1145		
41	Mach Ind.	.724	.733	.731	.729	.729
	KTAS	404	419	427	431	435
	Fuel - Lb/Hr	1049	1099	1126	1132	1147
39	Mach Ind.	.719	.718	.714	.719	.718
	KTAS	401	410	417	424	428
	Fuel - Lb/Hr	1055	1087	1105	1129	1141
37	Mach Ind.	.703	.702	.700	.701	.703
	KTAS	392	400	409	413	419
	Fuel - Lb/Hr	1047	1075	1100	1115	1133
35	Mach Ind.	.681	.679	.680	.686	.680
	KTAS	381	389	398	406	407
	Fuel - Lb/Hr	1044	1069	1099	1124	1126
30	Mach Ind.	.629	.624	.624	.626	.628
	KTAS	360	365	373	378	383
	Fuel - Lb/Hr	1067	1078	1112	1131	1144
25	KIAS	237	239	236	236	237
	KTAS	336	346	349	353	357
	Fuel - Lb/Hr	1102	1139	1153	1169	1186
20	KIAS	239	241	235	236	236
	KTAS	313	322	321	324	328
	Fuel - Lb/Hr	1148	1179	1174	1190	1208
15	KIAS	246	242	237	238	239
	KTAS	298	298	298	302	307
	Fuel - Lb/Hr	1226	1221	1227	1250	1277
10	KIAS	246	239	234	241	250
	KTAS	276	274	273	283	297
	Fuel - Lb/Hr	1269	1260	1277	1341	1418
5	KIAS	242	237	235	253	261
	KTAS	252	252	254	276	287
	Fuel - Lb/Hr	1297	1318	1363	1496	1565
S.L.	KIAS	239	239	237	237	236
	KTAS	233	237	239	240	242
	Fuel - Lb/Hr	1368	1403	1442	1469	1497

Figure 8-13
(Sheet 12 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 20,000 LB

ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.	.744				
	KTAS	416				
	Fuel - Lb/Hr	1173				
43	Mach Ind.	.742	.742	.742		
	KTAS	414	424	434		
	Fuel - Lb/Hr	1126	1155	1186		
41	Mach Ind.	.729	.735	.735	.732	.733
	KTAS	407	420	430	432	438
	Fuel - Lb/Hr	1084	1127	1160	1163	1180
39	Mach Ind.	.721	.721	.717	.721	.720
	KTAS	402	412	419	426	430
	Fuel - Lb/Hr	1078	1113	1132	1156	1166
37	Mach Ind.	.708	.707	.706	.705	.707
	KTAS	395	404	412	416	422
	Fuel - Lb/Hr	1075	1106	1131	1144	1163
35	Mach Ind.	.687	.685	.686	.688	.686
	KTAS	385	393	402	408	411
	Fuel - Lb/Hr	1073	1099	1128	1147	1157
30	Mach Ind.	.635	.625	.629	.632	.633
	KTAS	363	366	376	382	387
	Fuel - Lb/Hr	1092	1096	1138	1158	1170
25	KIAS	240	240	239	240	240
	KTAS	340	348	353	358	362
	Fuel - Lb/Hr	1132	1160	1184	1200	1217
20	KIAS	242	243	238	238	239
	KTAS	316	324	324	327	331
	Fuel - Lb/Hr	1173	1202	1200	1217	1236
15	KIAS	248	244	240	241	242
	KTAS	301	301	302	306	311
	Fuel - Lb/Hr	1247	1243	1255	1282	1307
10	KIAS	247	241	236	248	253
	KTAS	277	275	276	292	300
	Fuel - Lb/Hr	1287	1282	1304	1400	1445
5	KIAS	244	239	237	262	263
	KTAS	254	254	257	286	289
	Fuel - Lb/Hr	1321	1345	1393	1566	1588
S.L.	KIAS	242	241	239	239	261
	KTAS	235	239	241	242	267
	Fuel - Lb/Hr	1395	1431	1473	1499	1672

Figure 8-13
(Sheet 13 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 20,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind. KTAS Fuel – Lb/Hr					
49	Mach Ind. KTAS Fuel – Lb/Hr					
47	Mach Ind. KTAS Fuel – Lb/Hr					
45	Mach Ind. KTAS Fuel – Lb/Hr	.745 416 1223				
43	Mach Ind. KTAS Fuel – Lb/Hr	.744 416 1163	.744 425 1195			
41	Mach Ind. KTAS Fuel – Lb/Hr	.733 409 1119	.734 420 1150	.738 431 1192	.735 434 1198	
39	Mach Ind. KTAS Fuel – Lb/Hr	.720 401 1096	.724 414 1140	.722 422 1167	.724 427 1181	.722 431 1192
37	Mach Ind. KTAS Fuel – Lb/Hr	.713 398 1104	.712 406 1135	.709 414 1158	.711 420 1177	.712 424 1192
35	Mach Ind. KTAS Fuel – Lb/Hr	.693 388 1101	.690 396 1128	.691 405 1158	.690 409 1169	.690 414 1186
30	Mach Ind. KTAS Fuel – Lb/Hr	.641 367 1119	.630 369 1121	.635 379 1166	.638 385 1186	.637 389 1194
25	KIAS KTAS Fuel – Lb/Hr	244 345 1163	242 350 1179	243 358 1216	243 362 1231	244 367 1248
20	KIAS KTAS Fuel – Lb/Hr	245 320 1200	245 327 1224	240 328 1227	240 331 1244	241 335 1263
15	KIAS KTAS Fuel – Lb/Hr	251 303 1269	246 303 1266	243 305 1286	244 310 1313	245 314 1337
10	KIAS KTAS Fuel – Lb/Hr	249 279 1307	243 278 1306	243 284 1359	251 295 1427	255 303 1471
5	KIAS KTAS Fuel – Lb/Hr	245 256 1344	241 256 1374	256 277 1519	264 288 1589	265 291 1609
S.L.	KIAS KTAS Fuel – Lb/Hr	243 237 1420	243 241 1459	242 243 1504	241 245 1531	272 279 1765

Figure 8-13
(Sheet 14 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 21,000 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
43	Mach Ind.	.745	.745			
	KTAS	416	426			
	Fuel - Lb/Hr	1200	1234			
41	Mach Ind.	.735	.735	.737	.735	
	KTAS	410	420	431	434	
	Fuel - Lb/Hr	1153	1180	1217	1226	
39	Mach Ind.	.721	.728	.726	.727	.725
	KTAS	402	416	424	430	433
	Fuel - Lb/Hr	1123	1169	1200	1211	1221
37	Mach Ind.	.716	.715	.710	.715	.715
	KTAS	399	408	415	422	427
	Fuel - Lb/Hr	1129	1162	1180	1207	1220
35	Mach Ind.	.698	.696	.696	.692	.696
	KTAS	391	399	408	410	417
	Fuel - Lb/Hr	1129	1158	1187	1193	1217
30	Mach Ind.	.649	.634	.641	.645	.640
	KTAS	371	371	383	390	391
	Fuel - Lb/Hr	1149	1146	1195	1216	1217
25	KIAS	247	243	246	246	247
	KTAS	350	352	363	367	371
	Fuel - Lb/Hr	1193	1200	1247	1262	1280
20	KIAS	248	246	243	243	244
	KTAS	324	329	331	335	339
	Fuel - Lb/Hr	1228	1244	1257	1274	1294
15	KIAS	253	247	246	247	248
	KTAS	306	305	309	314	318
	Fuel - Lb/Hr	1291	1287	1317	1343	1367
10	KIAS	250	244	250	254	258
	KTAS	281	280	291	298	306
	Fuel - Lb/Hr	1327	1330	1410	1456	1497
5	KIAS	247	243	265	266	267
	KTAS	258	259	287	290	293
	Fuel - Lb/Hr	1367	1403	1593	1612	1631
S.L.	KIAS	245	245	244	263	281
	KTAS	239	243	246	267	287
	Fuel - Lb/Hr	1447	1487	1536	1690	1841

Figure 8-13
(Sheet 15 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 21,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
43	Mach Ind.	.745	.745			
	KTAS	416	426			
	Fuel – Lb/Hr	1239	1273			
41	Mach Ind.	.738	.738	.738		
	KTAS	412	422	432		
	Fuel – Lb/Hr	1188	1218	1251		
39	Mach Ind.	.725	.733	.731	.729	.729
	KTAS	405	419	427	431	435
	Fuel – Lb/Hr	1155	1200	1233	1238	1253
37	Mach Ind.	.714	.718	.712	.718	.717
	KTAS	398	410	416	424	428
	Fuel – Lb/Hr	1146	1188	1206	1234	1246
35	Mach Ind.	.702	.702	.700	.699	.702
	KTAS	393	403	410	414	420
	Fuel – Lb/Hr	1155	1190	1214	1228	1249
30	Mach Ind.	.655	.641	.649	.652	.642
	KTAS	375	375	388	394	392
	Fuel – Lb/Hr	1177	1178	1230	1249	1240
25	KIAS	250	246	249	249	250
	KTAS	354	355	367	371	376
	Fuel – Lb/Hr	1222	1229	1278	1294	1312
20	KIAS	251	247	246	247	247
	KTAS	328	330	336	339	343
	Fuel – Lb/Hr	1256	1263	1289	1307	1327
15	KIAS	255	249	249	250	251
	KTAS	308	307	313	318	322
	Fuel – Lb/Hr	1313	1309	1349	1374	1397
10	KIAS	252	246	253	257	260
	KTAS	282	282	295	302	309
	Fuel – Lb/Hr	1346	1356	1444	1484	1524
5	KIAS	249	245	267	268	269
	KTAS	260	261	289	292	295
	Fuel – Lb/Hr	1391	1431	1617	1635	1652
S.L.	KIAS	247	248	246	275	277
	KTAS	241	245	248	279	283
	Fuel – Lb/Hr	1475	1517	1568	1783	1814

Figure 8-13
(Sheet 16 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 22,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
43	Mach Ind.	.745	.745			
	KTAS	416	426			
	Fuel - Lb/Hr	1280	1316			
41	Mach Ind.	.742	.741	.742		
	KTAS	414	424	434		
	Fuel - Lb/Hr	1228	1258	1293		
39	Mach Ind.	.729	.734	.735	.730	.732
	KTAS	407	419	429	431	437
	Fuel - Lb/Hr	1189	1227	1266	1265	1287
37	Mach Ind.	.715	.720	.717	.720	.719
	KTAS	398	411	419	425	429
	Fuel - Lb/Hr	1168	1213	1240	1260	1273
35	Mach Ind.	.702	.707	.702	.706	.707
	KTAS	393	406	411	418	423
	Fuel - Lb/Hr	1174	1221	1238	1264	1281
30	Mach Ind.	.658	.648	.657	.656	.648
	KTAS	377	379	393	397	396
	Fuel - Lb/Hr	1199	1212	1264	1276	1272
25	KIAS	253	249	251	252	252
	KTAS	358	360	371	375	379
	Fuel - Lb/Hr	1248	1261	1306	1322	1338
20	KIAS	254	249	250	250	251
	KTAS	332	332	340	344	348
	Fuel - Lb/Hr	1285	1284	1322	1340	1360
15	KIAS	256	251	252	253	254
	KTAS	310	310	317	321	326
	Fuel - Lb/Hr	1334	1332	1380	1405	1427
10	KIAS	253	248	256	259	263
	KTAS	284	284	298	305	312
	Fuel - Lb/Hr	1368	1382	1474	1512	1551
5	KIAS	251	248	270	270	271
	KTAS	262	263	292	295	298
	Fuel - Lb/Hr	1415	1461	1642	1660	1676
S.L.	KIAS	249	250	264	283	279
	KTAS	243	247	266	287	285
	Fuel - Lb/Hr	1502	1547	1700	1859	1837

Figure 8-13
(Sheet 17 of 19)

LONG RANGE CRUISE
TWO ENGINE

ALTITUDE — 1000 FEET	WEIGHT - 22,500 LB	TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
43	Mach Ind.	.744				
	KTAS	416				
	Fuel - Lb/Hr	1320				
41	Mach Ind.	.744	.744	.744		
	KTAS	416	425	435		
	Fuel - Lb/Hr	1264	1299	1332		
39	Mach Ind.	.734	.732	.738	.734	
	KTAS	409	418	431	434	
	Fuel - Lb/Hr	1224	1248	1298	1302	
37	Mach Ind.	.718	.723	.721	.722	.721
	KTAS	401	413	421	427	431
	Fuel - Lb/Hr	1199	1239	1272	1287	1299
35	Mach Ind.	.701	.712	.702	.710	.710
	KTAS	393	408	412	421	426
	Fuel - Lb/Hr	1193	1250	1261	1296	1311
30	Mach Ind.	.660	.655	.664	.659	.655
	KTAS	378	384	397	399	400
	Fuel - Lb/Hr	1220	1246	1297	1301	1306
25	KIAS	254	251	253	254	253
	KTAS	360	363	374	378	381
	Fuel - Lb/Hr	1270	1290	1333	1348	1359
20	KIAS	257	252	253	253	254
	KTAS	335	336	344	348	352
	Fuel - Lb/Hr	1313	1315	1354	1374	1392
15	KIAS	258	253	255	256	256
	KTAS	312	313	320	324	328
	Fuel - Lb/Hr	1354	1361	1408	1433	1453
10	KIAS	255	252	259	262	265
	KTAS	286	289	302	308	314
	Fuel - Lb/Hr	1391	1419	1504	1540	1577
5	KIAS	252	258	272	272	273
	KTAS	264	274	294	297	300
	Fuel - Lb/Hr	1440	1538	1668	1683	1699
S.L.	KIAS	252	252	277	281	280
	KTAS	245	249	279	285	287
	Fuel - Lb/Hr	1532	1575	1803	1848	1859

Figure 8-13
(Sheet 18 of 19)

LONG RANGE CRUISE
TWO ENGINE

WEIGHT - 23,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
43	Mach Ind.	.744				
	KTAS	416				
	Fuel – Lb/Hr	1370				
41	Mach Ind.	.745	.745			
	KTAS	416	426			
	Fuel – Lb/Hr	1300	1338			
39	Mach Ind.	.735	.734	.738	.735	
	KTAS	410	419	431	434	
	Fuel – Lb/Hr	1255	1281	1325	1333	
37	Mach Ind.	.722	.726	.725	.725	.723
	KTAS	403	415	423	428	431
	Fuel – Lb/Hr	1231	1267	1304	1315	1325
35	Mach Ind.	.706	.715	.707	.715	.714
	KTAS	396	410	415	424	428
	Fuel – Lb/Hr	1225	1277	1294	1327	1340
30	Mach Ind.	.662	.661	.668	.662	.661
	KTAS	379	387	400	400	404
	Fuel – Lb/Hr	1241	1276	1325	1325	1339
25	KIAS	255	254	256	256	254
	KTAS	360	366	377	381	382
	Fuel – Lb/Hr	1286	1318	1359	1375	1379
20	KIAS	260	255	256	256	257
	KTAS	339	340	348	352	356
	Fuel – Lb/Hr	1341	1346	1387	1406	1425
15	KIAS	259	256	257	258	259
	KTAS	314	316	323	327	331
	Fuel – Lb/Hr	1374	1387	1435	1459	1480
10	KIAS	257	256	262	264	268
	KTAS	288	294	305	311	317
	Fuel – Lb/Hr	1414	1458	1533	1569	1604
5	KIAS	254	267	274	275	274
	KTAS	265	283	297	299	302
	Fuel – Lb/Hr	1465	1607	1693	1708	1721
S.L.	KIAS	254	254	283	283	282
	KTAS	247	252	285	287	289
	Fuel – Lb/Hr	1562	1606	1858	1869	1881

Figure 8-13
(Sheet 19 of 19)

HIGH SPEED CRUISE

WEIGHT - 14,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.	.763				
	KTAS	427				
	Fuel - Lb/Hr	887				
49	Mach Ind.	.780	.768	.726		
	KTAS	437	440	424		
	Fuel - Lb/Hr	910	912	832		
47	Mach Ind.	.780	.780	.768	.745	.707
	KTAS	437	447	450	440	422
	Fuel - Lb/Hr	914	962	937	880	821
45	Mach Ind.	.780	.780	.780	.778	.764
	KTAS	437	447	457	461	457
	Fuel - Lb/Hr	933	980	1029	1012	967
43	Mach Ind.	.780	.780	.780	.780	.780
	KTAS	437	447	457	462	467
	Fuel - Lb/Hr	961	1013	1065	1088	1115
41	Mach Ind.	.790	.790	.790	.790	.790
	KTAS	443	454	464	469	474
	Fuel - Lb/Hr	1053	1107	1164	1190	1220
39	Mach Ind.	.800	.800	.800	.800	.800
	KTAS	449	460	470	475	481
	Fuel - Lb/Hr	1178	1233	1297	1326	1359
37	Mach Ind.	.810	.810	.810	.810	.810
	KTAS	456	466	477	482	487
	Fuel - Lb/Hr	1346	1410	1479	1513	1549
35	Mach Ind.	.810	.810	.810	.810	.810
	KTAS	458	469	479	485	490
	Fuel - Lb/Hr	1459	1531	1602	1638	1677
30	Mach Ind.	.810	.810	.810	.810	.805
	KTAS	469	479	490	495	497
	Fuel - Lb/Hr	1825	1912	2001	2047	1951
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel - Lb/Hr	1997	2098	2183	2233	2280
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel - Lb/Hr	2054	2156	2247	2287	2338
15	KIAS	340	340	340	340	340
	KTAS	408	416	424	428	432
	Fuel - Lb/Hr	2057	2163	2257	2298	2340
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel - Lb/Hr	2100	2189	2280	2324	2368
5	KIAS	300	300	300	300	300
	KTAS	312	318	323	326	329
	Fuel - Lb/Hr	1729	1799	1861	1894	1930
S.L.	KIAS	300	300	300	300	300
	KTAS	291	296	301	304	306
	Fuel - Lb/Hr	1815	1886	1959	1992	2027

Figure 8-14
(Sheet 1 of 19)

HIGH SPEED CRUISE

WEIGHT - 14,500 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.	.744				
	KTAS	416				
	Fuel - Lb/Hr	876				
49	Mach Ind.	.780	.756			
	KTAS	437	432			
	Fuel - Lb/Hr	941	903			
47	Mach Ind.	.780	.780	.760	.730	
	KTAS	437	447	445	431	
	Fuel - Lb/Hr	939	988	936	871	
45	Mach Ind.	.780	.780	.780	.772	.755
	KTAS	437	447	457	458	451
	Fuel - Lb/Hr	955	1004	1052	1008	960
43	Mach Ind.	.780	.780	.780	.780	.780
	KTAS	437	447	457	462	467
	Fuel - Lb/Hr	981	1031	1084	1108	1135
41	Mach Ind.	.790	.790	.790	.790	.790
	KTAS	443	454	464	469	474
	Fuel - Lb/Hr	1071	1124	1183	1208	1239
39	Mach Ind.	.800	.800	.800	.800	.800
	KTAS	449	460	470	475	481
	Fuel - Lb/Hr	1194	1248	1314	1342	1376
37	Mach Ind.	.810	.810	.810	.810	.810
	KTAS	456	466	477	482	487
	Fuel - Lb/Hr	1363	1429	1497	1532	1568
35	Mach Ind.	.810	.810	.810	.810	.810
	KTAS	458	469	479	485	490
	Fuel - Lb/Hr	1470	1543	1613	1650	1689
30	Mach Ind.	.810	.810	.810	.810	.805
	KTAS	469	479	490	495	496
	Fuel - Lb/Hr	1831	1917	2007	2052	1950
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel - Lb/Hr	1999	2100	2186	2236	2283
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel - Lb/Hr	2055	2157	2248	2288	2339
15	KIAS	340	340	340	340	340
	KTAS	408	416	424	428	432
	Fuel - Lb/Hr	2058	2164	2258	2299	2341
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel - Lb/Hr	2102	2191	2282	2326	2371
5	KIAS	300	300	300	300	300
	KTAS	312	318	324	326	329
	Fuel - Lb/Hr	1731	1802	1863	1896	1932
S.L.	KIAS	300	300	300	300	300
	KTAS	291	296	301	304	306
	Fuel - Lb/Hr	1818	1888	1961	1995	2029

Figure 8-14
(Sheet 2 of 19)

HIGH SPEED CRUISE

WEIGHT - 15,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
49	Mach Ind.	.780	.737			
	KTAS	437	421			
	Fuel – Lb/Hr	977	890			
47	Mach Ind.	.780	.780	.751	.704	
	KTAS	437	447	439	416	
	Fuel – Lb/Hr	965	1017	934	854	
45	Mach Ind.	.780	.780	.780	.765	.745
	KTAS	437	447	457	453	445
	Fuel – Lb/Hr	977	1028	1079	1004	952
43	Mach Ind.	.780	.780	.780	.780	.779
	KTAS	437	447	457	462	466
	Fuel – Lb/Hr	1000	1050	1103	1129	1100
41	Mach Ind.	.790	.790	.790	.790	.790
	KTAS	443	453	464	469	474
	Fuel – Lb/Hr	1090	1142	1201	1228	1258
39	Mach Ind.	.800	.800	.800	.800	.800
	KTAS	449	460	470	475	481
	Fuel – Lb/Hr	1212	1265	1332	1361	1395
37	Mach Ind.	.810	.810	.810	.810	.810
	KTAS	456	466	477	482	487
	Fuel – Lb/Hr	1380	1449	1515	1553	1588
35	Mach Ind.	.810	.810	.810	.810	.810
	KTAS	458	469	479	485	490
	Fuel – Lb/Hr	1480	1555	1624	1663	1701
30	Mach Ind.	.810	.810	.810	.810	.804
	KTAS	469	479	490	495	496
	Fuel – Lb/Hr	1837	1923	2013	2058	1949
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel – Lb/Hr	2002	2103	2189	2239	2286
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel – Lb/Hr	2057	2159	2250	2290	2341
15	KIAS	340	340	340	340	340
	KTAS	408	416	424	428	432
	Fuel – Lb/Hr	2060	2166	2260	2301	2343
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel – Lb/Hr	2103	2193	2284	2328	2373
5	KIAS	300	300	300	300	300
	KTAS	312	318	324	326	329
	Fuel – Lb/Hr	1734	1804	1866	1899	1935
S.L.	KIAS	300	300	300	300	300
	KTAS	291	296	301	304	306
	Fuel – Lb/Hr	1820	1891	1964	1997	2032

Figure 8-14
(Sheet 3 of 19)

HIGH SPEED CRUISE

WEIGHT - 15,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind. KTAS Fuel – Lb/Hr					
49	Mach Ind. KTAS Fuel – Lb/Hr	.774 433 1011				
47	Mach Ind. KTAS Fuel – Lb/Hr	.780 437 993	.778 446 1037	.739 432 932		
45	Mach Ind. KTAS Fuel – Lb/Hr	.780 437 1001	.780 447 1053	.778 456 1070	.757 448 999	.731 436 942
43	Mach Ind. KTAS Fuel – Lb/Hr	.780 437 1021	.780 447 1070	.780 457 1124	.780 462 1151	.774 463 1096
41	Mach Ind. KTAS Fuel – Lb/Hr	.790 443 1110	.790 453 1160	.790 464 1221	.790 469 1249	.790 474 1279
39	Mach Ind. KTAS Fuel – Lb/Hr	.800 449 1230	.800 460 1286	.800 470 1351	.800 475 1382	.800 481 1415
37	Mach Ind. KTAS Fuel – Lb/Hr	.810 456 1398	.810 466 1470	.810 477 1534	.810 482 1574	.808 486 1522
35	Mach Ind. KTAS Fuel – Lb/Hr	.810 458 1493	.810 469 1570	.810 479 1638	.810 485 1679	.810 490 1717
30	Mach Ind. KTAS Fuel – Lb/Hr	.810 469 1844	.810 479 1929	.810 490 2020	.810 495 2065	.803 495 1947
25	KIAS KTAS Fuel – Lb/Hr	330 462 2004	330 472 2105	330 481 2192	330 486 2241	330 491 2289
20	KIAS KTAS Fuel – Lb/Hr	340 440 2058	340 449 2160	340 458 2251	340 462 2292	340 467 2343
15	KIAS KTAS Fuel – Lb/Hr	340 408 2061	340 416 2168	340 424 2262	340 428 2302	340 432 2345
10	KIAS KTAS Fuel – Lb/Hr	340 380 2105	340 387 2195	340 394 2287	340 398 2330	340 401 2375
5	KIAS KTAS Fuel – Lb/Hr	300 312 1736	300 318 1806	300 324 1868	300 326 1901	300 329 1937
S.L.	KIAS KTAS Fuel – Lb/Hr	300 291 1822	300 296 1893	300 301 1966	300 304 2000	300 306 2035

Figure 8-14
(Sheet 4 of 19)

HIGH SPEED CRUISE

WEIGHT - 16,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
49	Mach Ind.	.761				
	KTAS	426				
	Fuel – Lb/Hr	1002				
47	Mach Ind.	.780	.769	.721		
	KTAS	437	440	422		
	Fuel – Lb/Hr	1024	1028	929		
45	Mach Ind.	.780	.780	.771	.747	.712
	KTAS	437	447	452	441	425
	Fuel – Lb/Hr	1026	1079	1068	993	928
43	Mach Ind.	.780	.780	.780	.780	.767
	KTAS	437	447	457	462	459
	Fuel – Lb/Hr	1043	1094	1148	1176	1091
41	Mach Ind.	.790	.790	.790	.790	.787
	KTAS	443	453	464	469	472
	Fuel – Lb/Hr	1131	1183	1242	1272	1228
39	Mach Ind.	.800	.800	.800	.800	.799
	KTAS	449	460	470	475	480
	Fuel – Lb/Hr	1250	1308	1370	1404	1368
37	Mach Ind.	.810	.810	.810	.810	.807
	KTAS	456	466	477	482	485
	Fuel – Lb/Hr	1417	1491	1557	1595	1519
35	Mach Ind.	.810	.810	.810	.810	.809
	KTAS	458	469	479	485	489
	Fuel – Lb/Hr	1509	1589	1656	1698	1654
30	Mach Ind.	.810	.810	.810	.810	.803
	KTAS	469	479	490	495	495
	Fuel – Lb/Hr	1854	1938	2030	2075	1946
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel – Lb/Hr	2007	2108	2195	2244	2292
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel – Lb/Hr	2060	2162	2253	2294	2345
15	KIAS	340	340	340	340	340
	KTAS	408	416	424	428	432
	Fuel – Lb/Hr	2063	2169	2263	2304	2346
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel – Lb/Hr	2107	2198	2289	2333	2377
5	KIAS	300	300	300	300	300
	KTAS	312	318	324	326	329
	Fuel – Lb/Hr	1740	1810	1872	1905	1941
S.L.	KIAS	300	300	300	300	300
	KTAS	291	296	301	304	306
	Fuel – Lb/Hr	1825	1896	1970	2004	2038

Figure 8-14
(Sheet 5 of 19)

HIGH SPEED CRUISE

WEIGHT - 16,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.	.743				
	KTAS	415				
	Fuel - Lb/Hr	988				
47	Mach Ind.	.780	.757			
	KTAS	437	433			
	Fuel - Lb/Hr	1060	1017			
45	Mach Ind.	.780	.780	.765	.734	
	KTAS	437	447	448	433	
	Fuel - Lb/Hr	1051	1107	1066	985	
43	Mach Ind.	.780	.780	.780	.777	.760
	KTAS	437	447	457	461	455
	Fuel - Lb/Hr	1065	1118	1172	1148	1085
41	Mach Ind.	.790	.790	.790	.790	.783
	KTAS	443	453	464	469	469
	Fuel - Lb/Hr	1152	1207	1266	1295	1225
39	Mach Ind.	.800	.800	.800	.800	.797
	KTAS	449	460	470	475	478
	Fuel - Lb/Hr	1269	1330	1393	1426	1366
37	Mach Ind.	.810	.810	.810	.810	.804
	KTAS	456	466	477	482	484
	Fuel - Lb/Hr	1436	1513	1581	1618	1516
35	Mach Ind.	.810	.810	.810	.810	.807
	KTAS	458	469	479	485	488
	Fuel - Lb/Hr	1526	1608	1677	1718	1651
30	Mach Ind.	.810	.810	.810	.810	.802
	KTAS	469	479	490	495	494
	Fuel - Lb/Hr	1864	1948	2040	2022	1945
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel - Lb/Hr	2010	2111	2198	2247	2295
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel - Lb/Hr	2062	2164	2255	2296	2347
15	KIAS	340	340	340	340	340
	KTAS	408	416	424	428	432
	Fuel - Lb/Hr	2064	2171	2265	2306	2348
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel - Lb/Hr	2109	2200	2291	2335	2380
5	KIAS	300	300	300	300	300
	KTAS	312	318	324	326	329
	Fuel - Lb/Hr	1744	1814	1877	1910	1946
S.L.	KIAS	300	300	300	300	300
	KTAS	291	296	301	304	306
	Fuel - Lb/Hr	1829	1901	1974	2008	2043

Figure 8-14
(Sheet 6 of 19)

HIGH SPEED CRUISE

WEIGHT - 17,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.	.780	.739			
	KTAS	437	423			
	Fuel - Lb/Hr	1099	1001			
45	Mach Ind.	.780	.780	.756	.712	
	KTAS	437	447	442	420	
	Fuel - Lb/Hr	1079	1136	1064	972	
43	Mach Ind.	.780	.780	.780	.771	.752
	KTAS	437	447	457	457	449
	Fuel - Lb/Hr	1088	1143	1198	1144	1079
41	Mach Ind.	.790	.790	.790	.790	.779
	KTAS	443	453	464	469	467
	Fuel - Lb/Hr	1174	1232	1291	1323	1221
39	Mach Ind.	.800	.800	.800	.800	.794
	KTAS	449	460	470	475	476
	Fuel - Lb/Hr	1290	1354	1417	1449	1363
37	Mach Ind.	.810	.810	.810	.810	.802
	KTAS	456	466	477	482	482
	Fuel - Lb/Hr	1458	1538	1608	1646	1512
35	Mach Ind.	.810	.810	.810	.810	.806
	KTAS	458	469	479	485	487
	Fuel - Lb/Hr	1543	1628	1699	1739	1648
30	Mach Ind.	.810	.810	.810	.809	.801
	KTAS	469	479	490	494	494
	Fuel - Lb/Hr	1874	1958	2050	2020	1943
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel - Lb/Hr	2013	2114	2201	2251	2299
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel - Lb/Hr	2064	2166	2257	2298	2349
15	KIAS	340	340	340	340	340
	KTAS	408	416	424	428	432
	Fuel - Lb/Hr	2066	2173	2267	2308	2350
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel - Lb/Hr	2111	2202	2294	2337	2382
5	KIAS	300	300	300	300	300
	KTAS	312	318	324	326	329
	Fuel - Lb/Hr	1748	1819	1881	1914	1951
S.L.	KIAS	300	300	300	300	300
	KTAS	291	296	301	304	306
	Fuel - Lb/Hr	1833	1905	1979	2013	2048

Figure 8-14
(Sheet 7 of 19)

HIGH SPEED CRUISE

WEIGHT - 17,500 LB			TEMPERATURE — °C				
			ISA -10	ISA	ISA +10	ISA +15	ISA +20
ALTITUDE — 1000 FEET	51	Mach Ind.					
		KTAS					
		Fuel - Lb/Hr					
	49	Mach Ind.					
		KTAS					
		Fuel - Lb/Hr					
	47	Mach Ind.	.771				
		KTAS	432				
		Fuel - Lb/Hr	1126				
	45	Mach Ind.	.780	.779	.746		
		KTAS	437	447	436		
		Fuel - Lb/Hr	1109	1165	1061		
	43	Mach Ind.	.780	.780	.780	.765	.740
		KTAS	437	447	457	453	442
		Fuel - Lb/Hr	1111	1169	1226	1139	1070
	41	Mach Ind.	.790	.790	.790	.788	.774
		KTAS	443	453	464	468	464
		Fuel - Lb/Hr	1196	1256	1317	1293	1218
	39	Mach Ind.	.800	.800	.800	.800	.790
		KTAS	449	460	470	475	474
		Fuel - Lb/Hr	1312	1379	1444	1479	1360
	37	Mach Ind.	.810	.810	.810	.809	.800
		KTAS	456	466	477	482	481
		Fuel - Lb/Hr	1481	1565	1638	1611	1509
	35	Mach Ind.	.810	.810	.810	.810	.804
		KTAS	458	469	479	485	485
		Fuel - Lb/Hr	1561	1649	1721	1761	1645
	30	Mach Ind.	.810	.810	.810	.808	.801
		KTAS	469	479	490	493	493
		Fuel - Lb/Hr	1885	1968	2061	2018	1942
	25	KIAS	330	330	330	330	330
		KTAS	462	472	481	486	491
		Fuel - Lb/Hr	2016	2117	2204	2254	2302
	20	KIAS	340	340	340	340	340
		KTAS	440	449	458	462	467
		Fuel - Lb/Hr	2066	2168	2258	2300	2351
	15	KIAS	340	340	340	340	340
		KTAS	408	417	424	428	432
		Fuel - Lb/Hr	2068	2175	2269	2310	2352
	10	KIAS	340	340	340	340	340
		KTAS	380	387	394	398	401
		Fuel - Lb/Hr	2113	2205	2296	2340	2384
	5	KIAS	300	300	300	300	300
		KTAS	312	318	324	327	329
		Fuel - Lb/Hr	1752	1823	1886	1919	1956
	S.L.	KIAS	300	300	300	300	300
		KTAS	291	296	301	304	306
		Fuel - Lb/Hr	1838	1909	1983	2017	2053

Figure 8-14
(Sheet 8 of 19)

HIGH SPEED CRUISE

WEIGHT - 18,000 LB		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.	.760				
	KTAS	425				
	Fuel - Lb/Hr	1116				
45	Mach Ind.	.780	.771	.732		
	KTAS	437	442	428		
	Fuel - Lb/Hr	1144	1156	1057		
43	Mach Ind.	.780	.780	.778	.757	.727
	KTAS	437	447	456	448	434
	Fuel - Lb/Hr	1136	1196	1220	1134	1060
41	Mach Ind.	.790	.790	.790	.784	.769
	KTAS	443	453	464	465	460
	Fuel - Lb/Hr	1219	1282	1344	1289	1213
39	Mach Ind.	.800	.800	.800	.799	.787
	KTAS	449	460	470	475	472
	Fuel - Lb/Hr	1336	1406	1473	1445	1357
37	Mach Ind.	.810	.810	.810	.807	.799
	KTAS	456	466	477	480	480
	Fuel - Lb/Hr	1509	1593	1668	1609	1507
35	Mach Ind.	.810	.810	.810	.810	.802
	KTAS	458	469	479	485	484
	Fuel - Lb/Hr	1581	1670	1744	1785	1642
30	Mach Ind.	.810	.810	.810	.807	.800
	KTAS	469	479	490	493	493
	Fuel - Lb/Hr	1896	1979	2072	2017	1941
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel - Lb/Hr	2019	2120	2208	2257	2306
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel - Lb/Hr	2068	2170	2260	2302	2353
15	KIAS	340	340	340	340	340
	KTAS	408	417	425	428	432
	Fuel - Lb/Hr	2070	2177	2271	2312	2354
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel - Lb/Hr	2116	2207	2298	2342	2387
5	KIAS	300	300	300	300	300
	KTAS	312	318	324	327	329
	Fuel - Lb/Hr	1757	1828	1890	1924	1961
S.L.	KIAS	300	300	300	300	300
	KTAS	291	296	302	304	307
	Fuel - Lb/Hr	1842	1914	1988	2022	2058

ALTITUDE — 1000 FEET

Figure 8-14
(Sheet 9 of 19)

HIGH SPEED CRUISE

WEIGHT - 18,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.	.742				
	KTAS	415				
	Fuel - Lb/Hr	1100				
45	Mach Ind.	.780	.760			
	KTAS	437	435			
	Fuel - Lb/Hr	1182	1145			
43	Mach Ind.	.780	.780	.773	.747	.701
	KTAS	437	447	453	441	418
	Fuel - Lb/Hr	1163	1224	1217	1127	1042
41	Mach Ind.	.790	.790	.790	.780	.762
	KTAS	443	453	464	462	456
	Fuel - Lb/Hr	1243	1308	1371	1286	1208
39	Mach Ind.	.800	.800	.800	.796	.783
	KTAS	449	460	470	473	469
	Fuel - Lb/Hr	1360	1434	1502	1443	1354
37	Mach Ind.	.810	.810	.810	.805	.796
	KTAS	456	466	477	479	478
	Fuel - Lb/Hr	1538	1622	1698	1606	1504
35	Mach Ind.	.810	.810	.810	.809	.800
	KTAS	458	469	479	484	483
	Fuel - Lb/Hr	1605	1693	1770	1741	1639
30	Mach Ind.	.810	.810	.810	.807	.799
	KTAS	469	479	490	492	492
	Fuel - Lb/Hr	1908	1990	2084	2015	1940
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel - Lb/Hr	2023	2124	2212	2262	2311
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel - Lb/Hr	2070	2172	2262	2304	2355
15	KIAS	340	340	340	340	340
	KTAS	408	417	425	428	432
	Fuel - Lb/Hr	2072	2179	2273	2314	2356
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel - Lb/Hr	2118	2210	2301	2345	2389
5	KIAS	300	300	300	300	300
	KTAS	312	318	324	327	329
	Fuel - Lb/Hr	1762	1833	1895	1929	1966
S.L.	KIAS	300	300	300	300	300
	KTAS	291	296	302	304	307
	Fuel - Lb/Hr	1846	1918	1993	2027	2063

Figure 8-14
(Sheet 10 of 19)

HIGH SPEED CRUISE

WEIGHT - 19,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.	.780	.745			
	KTAS	437	426			
	Fuel - Lb/Hr	1224	1129			
43	Mach Ind.	.780	.780	.765	.734	
	KTAS	437	447	448	434	
	Fuel - Lb/Hr	1191	1253	1213	1119	
41	Mach Ind.	.790	.790	.790	.775	.755
	KTAS	443	453	464	459	451
	Fuel - Lb/Hr	1267	1335	1400	1283	1203
39	Mach Ind.	.800	.800	.800	.793	.780
	KTAS	449	460	470	471	467
	Fuel - Lb/Hr	1387	1462	1532	1440	1351
37	Mach Ind.	.810	.810	.810	.803	.793
	KTAS	456	466	477	478	476
	Fuel - Lb/Hr	1568	1651	1730	1603	1501
35	Mach Ind.	.810	.810	.810	.807	.799
	KTAS	458	469	479	483	482
	Fuel - Lb/Hr	1631	1719	1798	1739	1636
30	Mach Ind.	.810	.810	.810	.806	.798
	KTAS	469	479	490	492	492
	Fuel - Lb/Hr	1919	2001	2096	2014	1938
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel - Lb/Hr	2027	2128	2217	2266	2315
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel - Lb/Hr	2072	2174	2264	2307	2357
15	KIAS	340	340	340	340	340
	KTAS	408	417	425	428	432
	Fuel - Lb/Hr	2074	2181	2275	2316	2358
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel - Lb/Hr	2120	2212	2304	2347	2392
5	KIAS	300	300	300	300	300
	KTAS	312	318	324	327	329
	Fuel - Lb/Hr	1766	1837	1900	1934	1971
S.L.	KIAS	300	300	300	300	300
	KTAS	291	296	302	304	307
	Fuel - Lb/Hr	1851	1923	1998	2032	2068

Figure 8-14
(Sheet 11 of 19)

HIGH SPEED CRUISE

WEIGHT - 19,500 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.	.774				
	KTAS	433				
	Fuel - Lb/Hr	1277				
43	Mach Ind.	.780	.780	.758	.705	
	KTAS	437	447	443	416	
	Fuel - Lb/Hr	1225	1288	1209	1101	
41	Mach Ind.	.790	.790	.787	.770	.746
	KTAS	443	453	462	456	446
	Fuel - Lb/Hr	1294	1362	1375	1279	1195
39	Mach Ind.	.800	.800	.800	.790	.775
	KTAS	449	460	470	469	464
	Fuel - Lb/Hr	1416	1491	1564	1437	1347
37	Mach Ind.	.810	.810	.810	.801	.790
	KTAS	456	466	477	476	474
	Fuel - Lb/Hr	1599	1682	1718	1600	1498
35	Mach Ind.	.810	.810	.810	.805	.796
	KTAS	458	469	479	481	480
	Fuel - Lb/Hr	1659	1746	1827	1736	1633
30	Mach Ind.	.810	.810	.810	.804	.796
	KTAS	469	479	490	491	490
	Fuel - Lb/Hr	1934	2015	2111	2011	1935
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel - Lb/Hr	2031	2132	2221	2271	2320
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel - Lb/Hr	2074	2176	2267	2309	2360
15	KIAS	340	340	340	340	340
	KTAS	408	417	425	428	432
	Fuel - Lb/Hr	2076	2183	2277	2318	2360
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel - Lb/Hr	2122	2215	2306	2350	2395
5	KIAS	300	300	300	300	300
	KTAS	312	318	324	327	329
	Fuel - Lb/Hr	1771	1842	1905	1939	1976
S.L.	KIAS	300	300	300	300	300
	KTAS	291	297	302	304	307
	Fuel - Lb/Hr	1856	1928	2003	2038	2074

Figure 8-14
(Sheet 12 of 19)

HIGH SPEED CRUISE

WEIGHT - 20,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.	.765				
	KTAS	428				
	Fuel - Lb/Hr	1266				
43	Mach Ind.	.780	.777	.747		
	KTAS	437	445	437		
	Fuel - Lb/Hr	1260	1307	1203		
41	Mach Ind.	.790	.790	.783	.763	.735
	KTAS	443	453	459	452	439
	Fuel - Lb/Hr	1326	1394	1372	1274	1188
39	Mach Ind.	.800	.800	.799	.786	.770
	KTAS	449	460	469	466	461
	Fuel - Lb/Hr	1449	1525	1540	1434	1343
37	Mach Ind.	.810	.810	.807	.799	.787
	KTAS	455	466	475	475	472
	Fuel - Lb/Hr	1636	1718	1714	1597	1495
35	Mach Ind.	.810	.810	.810	.803	.794
	KTAS	458	469	479	480	479
	Fuel - Lb/Hr	1687	1773	1857	1733	1631
30	Mach Ind.	.810	.810	.810	.803	.795
	KTAS	469	479	490	490	489
	Fuel - Lb/Hr	1952	2032	2130	2009	1933
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel - Lb/Hr	2035	2136	2226	2275	2325
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel - Lb/Hr	2078	2180	2270	2313	2364
15	KIAS	340	340	340	340	340
	KTAS	408	417	425	429	432
	Fuel - Lb/Hr	2080	2187	2281	2322	2364
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel - Lb/Hr	2125	2218	2310	2353	2398
5	KIAS	300	300	300	300	300
	KTAS	312	318	324	327	329
	Fuel - Lb/Hr	1776	1847	1911	1944	1982
S.L.	KIAS	300	300	300	300	300
	KTAS	291	297	302	304	307
	Fuel - Lb/Hr	1860	1933	2008	2043	2079

Figure 8-14
(Sheet 13 of 19)

HIGH SPEED CRUISE

WEIGHT - 20,500 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
45	Mach Ind.	.752				
	KTAS	420				
	Fuel – Lb/Hr	1251				
43	Mach Ind.	.780	.769	.733		
	KTAS	437	441	428		
	Fuel – Lb/Hr	1296	1298	1196		
41	Mach Ind.	.790	.790	.778	.755	.719
	KTAS	443	453	456	446	429
	Fuel – Lb/Hr	1358	1427	1369	1268	1175
39	Mach Ind.	.800	.800	.795	.782	.765
	KTAS	449	460	467	464	457
	Fuel – Lb/Hr	1484	1559	1537	1431	1339
37	Mach Ind.	.810	.810	.805	.797	.783
	KTAS	455	466	473	473	470
	Fuel – Lb/Hr	1673	1757	1709	1595	1492
35	Mach Ind.	.810	.810	.810	.802	.791
	KTAS	458	469	479	479	477
	Fuel – Lb/Hr	1715	1801	1847	1730	1628
30	Mach Ind.	.810	.810	.809	.802	.793
	KTAS	469	479	489	489	488
	Fuel – Lb/Hr	1971	2051	2096	2006	1930
25	KIAS	330	330	330	330	330
	KTAS	462	472	481	486	491
	Fuel – Lb/Hr	2040	2141	2231	2280	2238
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	462	467
	Fuel – Lb/Hr	2081	2183	2274	2317	2368
15	KIAS	340	340	340	340	340
	KTAS	408	417	425	429	432
	Fuel – Lb/Hr	2084	2191	2285	2326	2369
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel – Lb/Hr	2129	2223	2314	2358	2403
5	KIAS	300	300	300	300	300
	KTAS	312	318	324	327	330
	Fuel – Lb/Hr	1781	1853	1916	1950	1988
S.L.	KIAS	300	300	300	300	300
	KTAS	291	297	302	304	307
	Fuel – Lb/Hr	1865	1938	2013	2048	2085

Figure 8-14
(Sheet 14 of 19)

HIGH SPEED CRUISE

WEIGHT - 21,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind. KTAS Fuel - Lb/Hr					
49	Mach Ind. KTAS Fuel - Lb/Hr					
47	Mach Ind. KTAS Fuel - Lb/Hr					
45	Mach Ind. KTAS Fuel - Lb/Hr					
43	Mach Ind. KTAS Fuel - Lb/Hr	.780 437 1338	.758 434 1285			
41	Mach Ind. KTAS Fuel - Lb/Hr	.790 443 1391	.790 453 1462	.772 452 1364	.746 441 1261	
39	Mach Ind. KTAS Fuel - Lb/Hr	.800 449 1520	.800 460 1596	.793 466 1535	.778 461 1428	.758 453 1333
37	Mach Ind. KTAS Fuel - Lb/Hr	.810 455 1711	.810 466 1798	.803 472 1706	.794 471 1592	.780 467 1489
35	Mach Ind. KTAS Fuel - Lb/Hr	.810 458 1744	.810 469 1830	.808 478 1843	.800 478 1728	.788 475 1625
30	Mach Ind. KTAS Fuel - Lb/Hr	.810 469 1990	.810 479 2072	.808 488 2093	.801 488 2004	.791 487 1927
25	KIAS KTAS Fuel - Lb/Hr	330 462 2044	330 472 2145	330 481 2235	330 486 2285	330 491 2237
20	KIAS KTAS Fuel - Lb/Hr	340 440 2084	340 449 2186	340 458 2277	340 462 2320	340 467 2371
15	KIAS KTAS Fuel - Lb/Hr	340 408 2089	340 417 2196	340 425 2290	340 429 2330	340 432 2373
10	KIAS KTAS Fuel - Lb/Hr	340 380 2134	340 387 2228	340 394 2319	340 398 2363	340 401 2408
5	KIAS KTAS Fuel - Lb/Hr	300 313 1786	300 318 1858	300 324 1921	300 327 1955	300 330 1993
S.L.	KIAS KTAS Fuel - Lb/Hr	300 291 1870	300 297 1943	300 302 2018	300 304 2054	300 307 2091

Figure 8-14
(Sheet 15 of 19)

HIGH SPEED CRUISE

WEIGHT - 21,500 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind. KTAS Fuel - Lb/Hr					
49	Mach Ind. KTAS Fuel - Lb/Hr					
47	Mach Ind. KTAS Fuel - Lb/Hr					
45	Mach Ind. KTAS Fuel - Lb/Hr					
43	Mach Ind. KTAS Fuel - Lb/Hr	.780 437 1397	.743 425 1267			
41	Mach Ind. KTAS Fuel - Lb/Hr	.790 443 1425	.787 451 1466	.765 448 1359	.733 433 1252	
39	Mach Ind. KTAS Fuel - Lb/Hr	.800 449 1556	.800 460 1634	.790 464 1532	.773 458 1424	.752 449 1328
37	Mach Ind. KTAS Fuel - Lb/Hr	.810 455 1751	.809 466 1827	.801 471 1703	.790 469 1588	.776 465 1486
35	Mach Ind. KTAS Fuel - Lb/Hr	.810 458 1776	.810 469 1863	.806 477 1839	.798 476 1725	.785 473 1622
30	Mach Ind. KTAS Fuel - Lb/Hr	.810 469 2009	.810 479 2093	.807 487 2091	.799 487 2001	.790 486 1925
25	KIAS KTAS Fuel - Lb/Hr	330 462 2049	330 472 2150	330 481 2240	330 486 2290	329 490 2236
20	KIAS KTAS Fuel - Lb/Hr	340 440 2088	340 449 2190	340 458 2281	340 463 2324	340 467 2375
15	KIAS KTAS Fuel - Lb/Hr	340 408 2093	340 417 2200	340 425 2294	340 429 2335	340 432 2378
10	KIAS KTAS Fuel - Lb/Hr	340 380 2138	340 387 2232	340 394 2324	340 398 2368	340 401 2413
5	KIAS KTAS Fuel - Lb/Hr	300 313 1792	300 318 1863	300 324 1927	300 327 1961	300 330 1999
S.L.	KIAS KTAS Fuel - Lb/Hr	300 291 1875	300 297 1949	300 302 2024	300 304 2060	300 307 2097

Figure 8-14
(Sheet 16 of 19)

HIGH SPEED CRUISE

WEIGHT - 22,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
43	Mach Ind.	.773				
	KTAS	433				
	Fuel - Lb/Hr	1439				
41	Mach Ind.	.790	.781	.758	.700	
	KTAS	443	448	443	413	
	Fuel - Lb/Hr	1473	1458	1353	1231	
39	Mach Ind.	.800	.799	.786	.768	.742
	KTAS	449	459	461	455	443
	Fuel - Lb/Hr	1593	1640	1528	1419	1320
37	Mach Ind.	.810	.807	.799	.788	.772
	KTAS	455	465	470	467	462
	Fuel - Lb/Hr	1792	1823	1700	1586	1482
35	Mach Ind.	.810	.810	.804	.795	.782
	KTAS	458	469	475	475	471
	Fuel - Lb/Hr	1812	1901	1835	1722	1618
30	Mach Ind.	.810	.810	.805	.798	.788
	KTAS	469	479	486	486	484
	Fuel - Lb/Hr	2029	2115	2087	1999	1922
25	KIAS	330	330	330	330	329
	KTAS	462	472	481	486	490
	Fuel - Lb/Hr	2053	2154	2246	2295	2235
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	463	467
	Fuel - Lb/Hr	2092	2194	2284	2328	2379
15	KIAS	340	340	340	340	340
	KTAS	409	417	425	429	432
	Fuel - Lb/Hr	2098	2205	2299	2340	2382
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	401
	Fuel - Lb/Hr	2142	2237	2329	2373	2418
5	KIAS	300	300	300	300	300
	KTAS	313	318	324	327	330
	Fuel - Lb/Hr	1797	1869	1933	1967	2005
S.L.	KIAS	300	300	300	300	300
	KTAS	291	297	302	304	307
	Fuel - Lb/Hr	1881	1954	2030	2066	2103

Figure 8-14
(Sheet 17 of 19)

HIGH SPEED CRUISE

WEIGHT - 22,500 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel – Lb/Hr					
43	Mach Ind.	.765				
	KTAS	428				
	Fuel – Lb/Hr	1427				
41	Mach Ind.	.790	.775	.747		
	KTAS	443	444	437		
	Fuel – Lb/Hr	1531	1450	1346		
39	Mach Ind.	.800	.795	.782	.762	.732
	KTAS	449	457	459	451	437
	Fuel – Lb/Hr	1649	1635	1524	1414	1312
37	Mach Ind.	.810	.804	.797	.784	.767
	KTAS	455	463	468	465	459
	Fuel – Lb/Hr	1854	1818	1697	1582	1477
35	Mach Ind.	.810	.810	.802	.792	.779
	KTAS	458	469	474	473	469
	Fuel – Lb/Hr	1848	1940	1832	1718	1615
30	Mach Ind.	.810	.810	.804	.796	.786
	KTAS	469	479	485	485	483
	Fuel – Lb/Hr	2050	2137	2084	1996	1918
25	KIAS	330	330	330	330	329
	KTAS	462	472	481	486	489
	Fuel – Lb/Hr	2060	2161	2253	2303	2234
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	463	467
	Fuel – Lb/Hr	2095	2197	2288	2332	2383
15	KIAS	340	340	340	340	340
	KTAS	409	417	425	429	432
	Fuel – Lb/Hr	2103	2210	2304	2344	2387
10	KIAS	340	340	340	340	340
	KTAS	380	387	394	398	402
	Fuel – Lb/Hr	2147	2243	2334	2378	2423
5	KIAS	300	300	300	300	300
	KTAS	313	318	324	327	330
	Fuel – Lb/Hr	1803	1874	1938	1973	2012
S.L.	KIAS	300	300	300	300	300
	KTAS	292	297	302	304	307
	Fuel – Lb/Hr	1886	1959	2035	2072	2109

Figure 8-14
(Sheet 18 of 19)

HIGH SPEED CRUISE

WEIGHT - 23,000 LB		TEMPERATURE — °C				
ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
51	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
49	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
47	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
45	Mach Ind.					
	KTAS					
	Fuel - Lb/Hr					
43	Mach Ind.	.753				
	KTAS	421				
	Fuel - Lb/Hr	1410				
41	Mach Ind.	.790	.766	.732		
	KTAS	443	439	428		
	Fuel - Lb/Hr	1631	1438	1335		
39	Mach Ind.	.800	.792	.778	.754	.715
	KTAS	449	455	456	446	427
	Fuel - Lb/Hr	1710	1630	1521	1407	1299
37	Mach Ind.	.810	.803	.794	.781	.762
	KTAS	455	461	466	463	456
	Fuel - Lb/Hr	1924	1815	1694	1579	1472
35	Mach Ind.	.810	.809	.800	.790	.776
	KTAS	458	468	473	471	467
	Fuel - Lb/Hr	1886	1970	1829	1716	1611
30	Mach Ind.	.810	.810	.802	.794	.783
	KTAS	469	479	484	483	481
	Fuel - Lb/Hr	2070	2160	2082	1993	1914
25	KIAS	330	330	330	330	328
	KTAS	462	472	481	486	488
	Fuel - Lb/Hr	2071	2172	2265	2315	2232
20	KIAS	340	340	340	340	340
	KTAS	440	449	458	463	467
	Fuel - Lb/Hr	2099	2201	2292	2336	2388
15	KIAS	340	340	340	340	340
	KTAS	409	417	425	429	433
	Fuel - Lb/Hr	2107	2214	2309	2349	2392
10	KIAS	340	340	340	340	340
	KTAS	380	387	395	398	402
	Fuel - Lb/Hr	2151	2248	2340	2384	2429
5	KIAS	300	300	300	300	300
	KTAS	313	318	324	327	330
	Fuel - Lb/Hr	1808	1880	1944	1979	2018
S.L.	KIAS	300	300	300	300	300
	KTAS	292	297	302	304	307
	Fuel - Lb/Hr	1891	1965	2041	2078	2115

Figure 8-14
(Sheet 19 of 19)

MAXIMUM RANGE DESCENT — ONE ENGINE

ALTITUDE ~ FT	DESCENT SPEED
51,000 to 49,000	0.70 MI
49,000 to 29,000	170 KIAS
29,000 to 21,000	0.45 MI
21,000 and below	200 KIAS

NOTE: This table represents the minimum sink-rate speed above the single-engine service ceiling and approximates the best rate-of-climb speed below the single-engine service ceiling.

Figure 8-15

LONG RANGE CRUISE
ONE ENGINE

WEIGHT - 14,000 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
30	MACH IND	.536	.533	.534	.538	.533
	KTAS	306	312	319	324	325
	FUEL-LB/HR	695	722	761	782	791
25	KIAS	198	198	196	198	198
	KTAS	282	289	292	297	300
	FUEL-LB/HR	693	728	753	776	795
20	KIAS	199	199	200	199	199
	KTAS	261	267	273	274	277
	FUEL-LB/HR	703	739	773	783	802
15	KIAS	200	202	202	202	202
	KTAS	243	250	254	258	260
	FUEL-LB/HR	724	760	794	814	829
10	KIAS	200	202	205	208	211
	KTAS	225	231	239	244	250
	FUEL-LB/HR	742	787	838	867	897
5	KIAS	203	209	214	216	216
	KTAS	212	222	232	235	237
	FUEL-LB/HR	794	859	919	939	952

WEIGHT - 15,000 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
30	MACH IND	.558	.545	.559	.552	.554
	KTAS	319	319	333	333	337
	FUEL-LB/HR	758	774	835	840	862
25	KIAS	205	205	204	205	205
	KTAS	292	298	303	308	311
	FUEL-LB/HR	750	783	818	839	858
20	KIAS	205	206	205	205	206
	KTAS	270	277	280	283	287
	FUEL-LB/HR	756	794	821	842	862
15	KIAS	207	208	208	207	206
	KTAS	251	257	262	264	265
	FUEL-LB/HR	774	810	848	861	874
10	KIAS	207	209	212	214	213
	KTAS	233	239	247	252	253
	FUEL-LB/HR	796	842	893	921	931
5	KIAS	211	216	221	222	219
	KTAS	220	230	239	242	241
	FUEL-LB/HR	847	911	971	989	987

Figure 8-16
(Sheet 1 of 5)

LONG RANGE CRUISE
ONE ENGINE

WEIGHT - 16,000 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
30	MACH IND	.566	.567	.568	.570	.548
	KTAS	324	332	339	344	334
	FUEL-LB/HR	801	849	886	910	886
25	KIAS	212	208	211	211	210
	KTAS	301	303	313	317	318
	FUEL-LB/HR	806	827	881	899	912
20	KIAS	212	212	212	212	212
	KTAS	278	284	289	292	296
	FUEL-LB/HR	809	845	881	901	922
15	KIAS	213	213	212	212	212
	KTAS	258	264	268	270	273
	FUEL-LB/HR	824	859	892	912	930
10	KIAS	214	216	218	217	215
	KTAS	241	247	255	255	255
	FUEL-LB/HR	850	898	945	956	966
5	KIAS	218	223	228	224	219
	KTAS	227	237	246	245	241
	FUEL-LB/HR	900	964	1022	1020	1011

WEIGHT - 17,000 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
30	MACH IND	.584	.588	.584	.561	.503
	KTAS	334	344	349	339	307
	FUEL-LB/HR	868	921	955	929	873
25	KIAS	217	216	217	216	217
	KTAS	309	314	322	323	327
	FUEL-LB/HR	858	898	942	953	978
20	KIAS	219	216	218	218	219
	KTAS	287	290	298	301	304
	FUEL-LB/HR	864	892	941	962	982
15	KIAS	219	219	218	219	219
	KTAS	266	271	275	278	281
	FUEL-LB/HR	876	912	949	971	991
10	KIAS	221	223	221	221	221
	KTAS	248	255	258	260	263
	FUEL-LB/HR	905	953	984	1000	1025
5	KIAS	224	229	229	225	220
	KTAS	234	244	248	245	242
	FUEL-LB/HR	953	1016	1052	1045	1038

Figure 8-16
(Sheet 2 of 5)

LONG RANGE CRUISE
ONE ENGINE

WEIGHT - 18,000 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
30	MACH IND	.603	.600	.570	.505	
	KTAS	345	351	341	305	
	FUEL-LB/HR	938	980	965	907	
25	KIAS	220	224	222	223	215
	KTAS	312	325	329	333	326
	FUEL-LB/HR	900	968	998	1022	1004
20	KIAS	225	223	224	224	223
	KTAS	295	299	306	309	311
	FUEL-LB/HR	918	955	1001	1021	1037
15	KIAS	226	224	225	225	225
	KTAS	274	277	283	286	289
	FUEL-LB/HR	929	961	1008	1031	1052
10	KIAS	227	228	226	226	227
	KTAS	255	261	263	267	269
	FUEL-LB/HR	957	1002	1032	1057	1080
5	KIAS	231	236	230	227	227
	KTAS	241	251	249	248	250
	FUEL-LB/HR	1006	1069	1080	1082	1100

WEIGHT - 19,000 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
30	MACH IND	.610	.609			
	KTAS	349	356			
	FUEL-LB/HR	991	1036			
25	KIAS	227	232	230	221	202
	KTAS	322	336	340	331	306
	FUEL-LB/HR	970	1038	1073	1046	989
20	KIAS	227	230	230	229	230
	KTAS	298	308	314	315	319
	FUEL-LB/HR	957	1018	1059	1077	1102
15	KIAS	230	230	231	231	231
	KTAS	279	284	291	294	296
	FUEL-LB/HR	977	1019	1067	1090	1110
10	KIAS	233	231	231	232	232
	KTAS	261	264	270	273	275
	FUEL-LB/HR	1006	1042	1089	1112	1135
5	KIAS	237	238	234	233	233
	KTAS	248	253	253	255	256
	FUEL-LB/HR	1058	1105	1123	1141	1161

Figure 8-16
(Sheet 3 of 5)

LONG RANGE CRUISE
ONE ENGINE

WEIGHT - 20,000 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
30	MACH IND	.613	.559			
	KTAS	351	327			
	FUEL-LB/HR	1043	1000			
25	KIAS	234	234	228	207	
	KTAS	332	340	338	311	
	FUEL-LB/HR	1040	1084	1097	1031	
20	KIAS	233	236	234	235	231
	KTAS	305	315	320	324	321
	FUEL-LB/HR	1015	1077	1115	1142	1140
15	KIAS	234	236	236	236	235
	KTAS	283	291	298	300	302
	FUEL-LB/HR	1020	1077	1126	1146	1166
10	KIAS	238	236	237	237	238
	KTAS	267	271	276	279	282
	FUEL-LB/HR	1056	1097	1146	1171	1195
5	KIAS	244	240	240	239	239
	KTAS	254	255	259	261	263
	FUEL-LB/HR	1111	1135	1180	1202	1224

WEIGHT - 21,000 LB

ALTITUDE — 1000 FEET		TEMPERATURE — °C ISA -10	ISA	ISA +10	ISA +15	ISA +20
30	MACH IND	.569				
	KTAS	326				
	FUEL-LB/HR	1020				
25	KIAS	241	240	216		
	KTAS	342	348	321		
	FUEL-LB/HR	1110	1151	1085		
20	KIAS	240	241	240	237	222
	KTAS	314	323	328	326	310
	FUEL-LB/HR	1083	1136	1179	1184	1130
15	KIAS	240	241	242	240	241
	KTAS	291	298	304	306	309
	FUEL-LB/HR	1081	1134	1184	1201	1230
10	KIAS	241	242	243	243	243
	KTAS	271	277	283	286	288
	FUEL-LB/HR	1100	1154	1205	1231	1253
5	KIAS	247	244	245	245	245
	KTAS	258	260	266	268	270
	FUEL-LB/HR	1153	1184	1239	1261	1285

Figure 8-16
(Sheet 4 of 5)

LONG RANGE CRUISE
ONE ENGINE

WEIGHT - 22,000 LB	ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
	30	MACH IND					
		KTAS					
		FUEL-LB/HR					
	25	KIAS	247	242			
		KTAS	349	351			
		FUEL-LB/HR	1172	1199			
	20	KIAS	247	245	244	229	
		KTAS	323	327	332	316	
		FUEL-LB/HR	1152	1187	1232	1175	
	15	KIAS	246	247	246	246	245
		KTAS	298	305	309	313	314
		FUEL-LB/HR	1141	1194	1236	1266	1280
	10	KIAS	247	248	249	248	248
		KTAS	277	284	290	292	294
		FUEL-LB/HR	1156	1212	1266	1287	1311
	5	KIAS	249	249	250	250	250
		KTAS	260	265	271	273	275
		FUEL-LB/HR	1185	1237	1291	1316	1342

TEMPERATURE — °C

WEIGHT - 23,000 LB	ALTITUDE — 1000 FEET		ISA -10	ISA	ISA +10	ISA +15	ISA +20
	30	MACH IND					
		KTAS					
		FUEL-LB/HR					
	25	KIAS	251	230			
		KTAS	355	334			
		FUEL-LB/HR	1231	1180			
	20	KIAS	254	251	236	210	
		KTAS	332	335	323	291	
		FUEL-LB/HR	1219	1254	1224	1153	
	15	KIAS	252	252	251	252	238
		KTAS	305	311	316	320	306
		FUEL-LB/HR	1201	1252	1300	1329	1273
	10	KIAS	252	253	253	253	253
		KTAS	283	290	295	297	301
		FUEL-LB/HR	1212	1271	1321	1344	1374
	5	KIAS	253	254	254	254	254
		KTAS	264	270	275	278	280
		FUEL-LB/HR	1232	1290	1344	1370	1397

TEMPERATURE — °C

Figure 8-16
(Sheet 5 of 5)

DESCENT AND HOLDING PERFORMANCE

The descent and holding performance presented on the following pages is based upon flight test data and represents the average delivered aircraft.

DESCENT PERFORMANCE SCHEDULE

Figures 8-17 and 8-18 show time, distance and fuel used, for normal and high-speed descents respectively, from a given altitude to sea level. An average descent weight of 16,000 pounds is assumed in the tables. Subtraction of performance values for two altitudes results in the time, distance and fuel required for descent between the two altitudes. The descent speed schedule is presented with each table. The power setting for descent is IDLE thrust. Data are shown without the use of spoilers. Descent performance is improved if spoilers are deployed.

HOLDING OPERATIONS

Figure 8-19 shows fuel flows and holding speeds for various weights and altitude conditions. The holding speeds presented are sufficient to ensure a comfortable margin above shaker operation or low-speed buffet while maneuvering in a holding pattern.

DESCENT PERFORMANCE SCHEDULE

NORMAL DESCENT

ALTITUDE 1000 Ft	TIME Min.	DISTANCE N.M.	FUEL Lb
51	17.6	114	167
49	16.6	106	157
47	15.4	97	144
45	14.1	88	131
43	12.9	80	118
41	11.9	72	107
39	11.0	66	98
37	10.2	60	90
35	9.6	55	83
33	9.1	52	78
31	8.6	48	74
29	8.3	46	70
27	7.9	43	67
25	7.5	40	63
23	7.1	37	59
21	6.6	34	55
19	6.2	31	51
17	5.8	28	48
15	5.3	25	44
13	4.9	23	41
11	4.4	20	37
9	3.7	16	31
7	2.9	13	25
5	2.1	9	19

DESCENT SPEED: 51,000 to 28,000 feet .... 0.76 MI
28,000 to 10,000 feet .... 300 KIAS
10,000 feet and below .... 250 KIAS

Figure 8-17

DESCENT PERFORMANCE SCHEDULE
HIGH SPEED DESCENT

ALTITUDE 1000 Ft	TIME Min.	DISTANCE N.M.	FUEL Lb
51	16.3	106	154
49	15.2	98	144
47	14.0	89	131
45	12.8	80	118
43	11.6	72	105
41	10.6	65	95
39	9.9	59	87
37	9.3	55	81
35	8.8	51	76
33	8.4	48	72
31	8.0	45	69
29	7.7	43	66
27	7.5	41	63
25	7.2	38	60
23	6.8	36	57
21	6.5	33	54
19	6.1	31	51
17	5.8	28	48
15	5.4	26	45
13	5.0	23	42
11	4.5	20	38
9	3.7	16	31
7	2.9	13	25
5	2.1	9	19

NOTE: The speed schedule portrayed below occurs when high-speed descend feature has been selected in the LVL CHG (Level Change) mode of the engaged autopilot.

DESCENT SPEED:
- 51,000 to 43,000 feet .... 0.76 MI
- 43,000 to 37,000 feet .... 0.76 to 0.79 MI
- 37,000 to 27,000 feet .... 0.79 MI
- 27,000 to 14,500 feet .... 320 KIAS
- 14,500 to 10,500 feet .... 320 to 250 KIAS
- 10,500 feet and below .... 250 KIAS

Figure 8-18

HOLDING OPERATIONS

ALTITUDE — 1000 FEET		WEIGHT — 1000 LB 15	16	17	18	19	20	21	22	23
41	Mach Ind	.650	.659	.672	.693	.704	.712	.715	.723	.741
	Fuel - Lb/Hr	787	835	891	962	1021	1080	1136	1214	1323
39	Mach Ind	.626	.643	.654	.664	.683	.695	.703	.710	.713
	Fuel - Lb/Hr	774	832	881	932	1002	1061	1118	1174	1231
37	Mach Ind	.604	.619	.636	.652	.654	.662	.684	.695	.703
	Fuel - Lb/Hr	765	819	876	933	972	1024	1100	1158	1214
35	Mach Ind	.594	.604	.611	.628	.643	.646	.654	.662	.683
	Fuel - Lb/Hr	784	828	871	929	984	1027	1077	1131	1208
33	Mach Ind	.566	.581	.594	.612	.627	.629	.634	.641	.658
	Fuel - Lb/Hr	787	837	885	943	999	1036	1082	1132	1201
31	Mach Ind	.541	.559	.575	.594	.609	.612	.615	.621	.636
	Fuel - Lb/Hr	789	845	898	957	1011	1048	1087	1134	1199
29	Mach Ind	.515	.537	.555	.575	.590	.595	.595	.600	.613
	Fuel - Lb/Hr	790	853	910	970	1023	1060	1092	1136	1196
25	KIAS	170	175	180	185	190	195	200	205	210
	Fuel - Lb/Hr	740	787	835	882	930	978	1025	1073	1123
20	KIAS	170	175	180	185	190	195	200	205	210
	Fuel - Lb/Hr	788	831	875	919	965	1010	1055	1101	1148
15	KIAS	170	175	180	185	190	195	200	205	210
	Fuel - Lb/Hr	837	877	918	960	1001	1044	1087	1132	1178
10	KIAS	170	175	180	185	190	195	200	205	210
	Fuel - Lb/Hr	875	915	956	999	1042	1087	1134	1181	1230
5	KIAS	170	175	180	185	190	195	200	205	210
	Fuel - Lb/Hr	903	949	995	1043	1091	1143	1194	1247	1301

Figure 8-19